Release in Full

[redacted]

HISTORY

EPA #1
History 19 pages

EPA #1
History 19 pages
1950 – 1988

6P.

PRODUCTION
FILE COPY

EAST POPIAR UNIT WELL NO. 1

ROOSEVELT COUNTY, MONTANA

MURPHY CORPORATION - OPERATOR

I N D E X

EAST POPLAR UNIT WELL NO. 1

ROOSEVELT COUNTY, MONTANA

MURPHY CORPORATION - OPERATOR

H I S T O R Y

SUMMARY OF WELL HISTORY

WELL NAME AND NUMBER:	East Poplar Unit Well No. 1
LOCATION:	SW NE Sec. 2, T28N, R51E
DRILLING UNIT:	Wildcat
WORKING INTEREST:	31.648570% (1956)
REVENUE INTEREST:	24.610847 0% (1956)
ELEVATION:	2111' Ground - 2123' R.K.B.
WELL HEAD MARKER:	R.K.B. to top of 13 3/8" casing head flange-12.30'
CONTRACTOR:	Cook Drilling Company
SPUDDED:	10:45 P.M., September 16, 1951
COMPLETED:	March 10, 1952
TOTAL DEPTH:	9163' Schlumberger - 5827' PBTD
CASING:	13 3/8" @ 1013.00' w/700 sx cement 7" @ 5813.75' w/200 sx cement
INITIAL PRODUCTION INTERVAL:	Perf. "C" Zone 5799-5814' w/6 bullets per ft. "C" Zone - Open hole 5814-5827' Perf. "B-1" & "B-2" Zones 5646-5680' w/4 jet shots per ft.
TUBING:	2 1/2" set in packer at 5750'
PACKER:	Baker Model "D" Production Packer @ 5750'
INITIAL POTENTIAL:	"B-1" & "B-2" Zones Co-mingled. Flowed on 10/64" choke 24 hrs. (233 BOPD, .6% water) CFP 525# "C" Zone flowed on 8/64" choke 24 hrs. (252 BOPD, .6% water) TFP 800#.
INITIAL ACID TREATMENT:	None
INITIAL FRAC TREATMENT:	None
TYPE COMPLETION:	Dual Completion w/the "B-1" & "B-2" Zones flowing co-mingled through the casing and the "C" Zone flowing through the tubing.

DISCOVERY WELL

Well No. 10-A

Well Name C.H.Murphy Jr - Ind. 12892, #1 Unit, Well #1

Twp. 28 N.

Rge. 51 E.

Structure
East Poplar Prospect

Sec. 2

County

Location
C SW NE

State
Montana

Surface Elevation and Formation
2123

API # 25-085-05058

Landowner
Unitized Ind. 12892

Lessee
C.H.Murphy Jr.

Drilling Company
C.H.Murphy Jr.

Representative in Charge

Contractor or Driller

Date Location

Date Spudded
9-15-51

8-18-51 Loc (MOJ)

9-7-51 RURT (FCP) LOG IN FILE

9-21-51 Drilling 800 (FCP)

9-29-51 WOC 1057, 1013' of 13-5/8" w/ 700 sx. Jud Riv 1025 (FCP)

10-5-51 Drilling 3124 (FCP)

10-10-51 Drilling 4772 (FCP)

10/19/51 Drilling 5134, DST 4772-4786 in Amsden, open 30 min. weak blow 24 min; Rec 30' of 41° oil and gas cut mud, and 85' brackish water; no pressures taken (FCP)

Completed	Total Depth	Formation
2-20-52	9163	Ordovician

Oil	Gas	Water

Flow 354 BOPD thur 1/8" choke

Final Result & 232 BOPD thur 10/64" choke

10-26-51 Drilling 5674, Kibbey 5170; Report unconfirmed DST made 2000' oil in 20 min, from Madison (FCP)

11-5-51 Drilling 5809 (FCP)

11-9-51 Drilling 5818 (FCP)

11-16-51 WOC 5830 7" at 5814 w/ 200 sx (FCP)

LETTER FROM FCP: dated 11-5-51 to I.J.Hares, Supt Ohio Oil Co. Bridger:

"That Murphy well at Poplar was the one I talked to you about. Guess it's extra good, because one DST wit a 100 ft. water cushion got 4250' of oil in the hole, open only 20 minute Not too bad, now let's see what they do about it. Carter Oil will be down to the same horizon shortly on Poplar. They were drilling at 5143 last week, and Murphy's DST was from 5668-5692. If Carter hits, Poplar Dome will be very hot and so will any acreage there.

11-21-51 Drilling 5890, Kibbey 5160 Water (Sul) 5383 (FCP)

12-7-51 Drilling 6145, 7" at 5814 w/ 200 sx. Kibbey 5160 Sulphur water 5833 (FCP)

12-14-51 Coring 6372 (FCP)

12-21-51 Coring 6990, Charles 5320? Mission Canyon 5640 (FCP)

1-5-52 Coring 7394 DST 5668-920PEN using 1000 water cushion, open 20 min Rec water cushion and 4150' oil; 5833, Wul Water (FCP)

13p

LEASE NO. 3858

CONTRACT NO. I-3712897

5-154e
(August 1961)

RECEIVED OR FILED
BUREAU OF INDIAN AFFAIRS
BILLINGS AREA OFFICE

SEP 10 1 58 PM '88

BRANCH OF REALTY
TITLES & RECORDS
SECTION

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

206 60807

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior or his authorized representative has heretofore approved Oil and Gas mining lease, dated July 31, 1950, entered into by and between Birdie Lester Vance et ux, lessor, and C. H. Murphy, Jr., lessee, covering the following-described lands in the Fort Peck Reservation (Insert name of Reservation, Pueblo, Nation, etc., as needed) in the State of Montana

Township 28 North, Range 51 East
Section 10: $NW\frac{1}{4}$, $W\frac{1}{2}SW\frac{1}{4}$
Section 15: $W\frac{1}{2}NW\frac{1}{4}$
Section 21: $SE\frac{1}{4}NE\frac{1}{4}$

NOW, THEREFORE, for and in consideration of Ten dollars and other valuable consideration dollars ($10.00), the receipt of which is hereby acknowledged, the said Wellstar Corporation the owner of the above-described lease, hereby bargains, sells, transfers, assigns, and conveys all of its right, title, and interest in and to said lease,

subject to the approval of the Secretary of the Interior or his authorized representative to Murphy Oil USA, Inc., of 200 Peach Street, El Dorado, AR 71730. Said assignment to be effective from date of approval hereby by the Secretary of the Interior or his authorized representative.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 19th day of Jan., 1987.

WELLSTAR CORPORATION

By: Walter Mayer
Walter Mayer, President

By: Dorothy Mayer
Secretary

206 : 60807

LEASE No. 17777(78)

CONTRACT No. I-37-Ind-12897

5-154e
(August 1961)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior or his authorized representative has heretofore approved OIL AND GAS mining lease, dated July 31, 19 50, entered into by and between Birdie Lester Vance and Leroy Vance, husband and wife, lessor, and C. H. MURPHY, JR., lessee, covering the following-described lands in the FORT PECK INDIAN RESERVATION
(Insert name of Reservation, Pueblo, Nation, etc., as needed)
in the State of MONTANA, COUNTY OF ROOSEVELT

Township 28 North, Range 51 East M.P.M.

Section 10: NW/4, W/2 SW/4

Section 15: W/2 NW/4

Section 21: SE/4 NE/4

NOW, THEREFORE, for and in consideration of Ten and more dollars ($10.00), the receipt of which is hereby acknowledged, the said FAIRWAY RESOURCES, INC. the owner of the above-described lease, hereby bargains, sells, transfers, assigns, and conveys ALL OF ITS right, title, and interest in and to said lease,

subject to the approval of the Secretary of the Interior or his authorized representative to WELLSTAR CORPORATION, of 9704 State Highway 66, Platteville, CO 80651. Said assignment to be effective from date of approval hereby by the Secretary of the Interior or his authorized representative.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 16th day of SEPTEMBER, 1986

FAIRWAY RESOURCES, INC.

By: Steven A. Roitman

Steven A. Roitman, President

ATTEST:

David Roitman, Secretary

(OVER)

5-154e
(August 1961)

LEASE No. 3858

CONTRACT No. I-3712897

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

206 60807

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior or his authorized representative has heretofore approved Oil and Gas mining lease, dated July 31, 1950, entered into by and between Birdie Lester Vance et ux, lessor, and C. H. Murphy, Jr., lessee, covering the following-described lands in the Fort Peck Reservation
(Insert name of Reservation, Pueblo, Nation, etc., as needed)
in the State of Montana

Township 28 North, Range 51 East
Section 10: $NW\frac{1}{4}$, $W\frac{1}{2}SW\frac{1}{4}$
Section 15: $W\frac{1}{2}NW\frac{1}{4}$
Section 21: $SE\frac{1}{4}NE\frac{1}{4}$

NOW, THEREFORE, for and in consideration of Ten dollars and other valuable consideration dollars ($10.00), the receipt of which is hereby acknowledged, the said TPEX Exploration, Inc. the owner of the above-described lease, hereby bargains, sells, transfers, assigns, and conveys all of its right, title, and interest in and to said lease,

subject to the approval of the Secretary of the Interior or his authorized representative to Murphy Oil USA, Inc., of 200 Peach Street, El Dorado, AR 71730. Said assignment to be effective from date of approval hereby by the Secretary of the Interior or his authorized representative.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 23rd day of January, 19 87

TPEX EXPLORATION, INC. CORPORATE SEAL

TPEX Exploration, Inc.

By: Hunter S. Swanson

Hunter S. Swanson, President

(OVER)

205 60807

#42

LEASE NO. 17777(78)

3-6429
(August 1961)

CONTRACT NO. I-37 Ind-12897

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior or his authorized representative has heretofore approved Oil and Gas mining lease, dated July 31, 1950, entered into by and between Birdie Lester Vance and Leroy Vance, wife and husband lessor, and C. H. Murphy, Jr., lessee, covering the following-described lands in the Fort Peck Indian Reservation (Insert name of Reservation, Pueblo, Nation, etc., as needed) in the State of Montana, County of Roosevelt

Township 28 North, Range 51 East M.P.M.

Section 10: NW/4, W/2 SW/4

Section 15: W/2 NW/4

Section 21: SE/4 NE/4

NOW, THEREFORE, for and in consideration of Ten and more dollars ($10.00), the receipt of which is hereby acknowledged, the said Partnership Properties Co. the owner of the above-described lease, hereby bargains, sells, transfers, assigns, and conveys all of its right, title, and interest in and to said lease,

subject to the approval of the Secretary of the Interior or his authorized representative to Fairway Resources, Inc. - 87.5%, TPEX Exploration, Inc. - 12.5%, of 1536 Cole Boulevard, Ste. 2 Golden, Colorado 80401. Said assignment to be effective from date of approval hereby by the Secretary of the Interior or his authorized representative.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 15th day of January, 1985

PARTNERSHIP PROPERTIES, CO.

By [signature]

Charles E. Holmes

Attorney-in-fact

16—11683-8

(OVER)

206 60807

LEASE NO. 17777(78)

5-154e
(August 1961)

CONTRACT NO. I-37-Ind-12897

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior or his authorized representative has heretofore approved oil and gas mining lease, dated approved July 31, 19 50, entered into by and between Birdie Lester Vance and Leroy Vance, wife and husband, lessor, and C. H. Murphy, Jr., lessee, covering the following-described lands in the Fort Peck Indian Reservation
(Insert name of Reservation, Pueblo, Nation, etc., as needed)
in the State of Montana, County of Roosevelt:

Township 28 North, Range 51 East M.P.M.

Section 10: SW/4, W/2 SW/4

Section 15: W/2 NW/4

Section 21: SE/4 NE/4

NOW, THEREFORE, for and in consideration of Ten and more dollars ($ 10.00), the receipt of which is hereby acknowledged, the said Placid Oil Company the owner of the above-described lease, hereby bargains, sells, transfers, assigns, and conveys all of their (50%) right, title, and interest in and to said lease,

subject to the approval of the Secretary of the Interior or his authorized representative to Partnership Properties Co., of 717 Seventeenth St., Denver, Colorado. Said assignment to be effective from date of approval hereby by the Secretary of the Interior or his authorized representative.

IN WITNESS WHEREOF, the said assignor has hereunto set its hand and seal, this 20th day of January, 19 82

PAUL W. HICKS, SECRETARY

PLACID OIL COMPANY

C. D. BROWN, PRESIDENT

(OVER)

ASSIGNED EFFECTIVE 12/31/52 FROM C.H. MURPHY, Jr. ALL TO: MURPHY CORPORATION 15/32
PLACID OIL CO. 16/32
Wm. & THEODOSA NOLAN 1/32

ASSIGNED EFFECTIVE 9/29/54 FROM MURPHY TO: MARINE OIL 1/4 OF 15/32 OR 15/128
OWNERS: MURPHY 45/128, PLACID OIL CO. 64/128, NOLANS 4/128, & MARINE OIL 15/128

ASSIGNED EFFECTIVE 4/1/55 FROM MARINE OIL TO Wm. J. SHERRY 1/4 OF 15/128 OR 15/512
OWNERS: MURPHY 180/512, PLACID OIL CO. 256/512, NOLANS 16/512, MARINE OIL 45/512, & Wm. J. SHERRY 15/512

ASSIGNED EFFECTIVE 4/4/55 FROM Wm. J. SHERRY TO: MURPHY 1/4 OF 15/512 OR 15/2048
OWNERS: MURPHY 735/2048, PLACID OIL CO. 1024/2048, NOLANS 64/2048, MARINE OIL 180/2048, & Wm. J. SHERRY 45/2048

ASSIGNED EFFECTIVE 4/2/82 FROM PLACID OIL CO. TO: PARTNERSHIP PROPERTIES COMPANY- ALL
OWNERS: MURPHY 735/2048, NOLANS 64/2048, MARINE OIL 180/2048, Wm. J. SHERRY 45/2048, & PARTNERSHIP PROPERTIES COMPANY 1024/2048

ASSIGNED EFFECTIVE 12/16/86 FROM PARTNERSHIP PROPERTIES COMPANY TO: FAIRWAY RESOURCES, INC. (896/2048), & TPEX EXPLORATION, INC. (128/2048)
OWNERS: MURPHY 735/2048, NOLANS 64/2048, MARINE OIL 180/2048, Wm. J. SHERRY 45/2048, FAIRWAY RESOURCES, INC. 896/2048, & TPEX EXPLORATION, INC. 128/2048

ASSIGNED EFFECTIVE 12/16/86 FROM FAIRWAY RESOURCES, INC. (896/2048) TO:WELLSTAR CORPORATION (896/2048)

ASSIGNED EFFECTIVE 3/19/87 FROM: TPEX EXPLORATION, INC. (128/2048) TO: MURPHY OIL USA, INC.

ASSIGNED EFFECTIVE 3/19/87 FROM: WELLSTAR CORPORATION (896/2048) TO: MURPHY OIL USA, INC.

206 - 60807

205 60807

ADAPTED FROM
FORM 5-154E

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Contract No. I-37-Ind-1289
Lease No. 385

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior has heretofore approved a certain oil and gas mining lease ~~dated~~ approved July 31, 1950, entered into by and between Birdie Lester Vance et vir, Lessors, and C. H. MURPHY, JR., Lessee, covering the following described lands in the Fort Peck Indian Reservation in the State of Montana, County of Roosevelt:

Township 28 North, Range 51 East M.P.M.
Sec. 10: NW/4; W/2 SW/4
Sec. 15: W/2 NW/4
Sec. 21: SE/4 NE/4

WHEREAS, the above described lease is subject to a certain Unit Agreement designated I-Sec. No. 869, approved by the Assistant Commissioner of Indian Affairs on August 22, 1951, and approved by the Acting Director of the United States Geological Survey on August 23, 1951; and

WHEREAS, by mesne assignments heretofore consummated, WILLIAM J. SHERRY of Tulsa, Oklahoma, is the present owner of an undivided interest in and to the above described lease.

NOW, THEREFORE, for and in consideration of TEN AND MORE dollars ($10.00), the receipt of which is hereby acknowledged, the said WILLIAM J. SHERRY does hereby bargain, sell, transfer, assign and convey unto MURPHY CORPORATION, a Louisiana Corporation, of El Dorado, Arkansas, an undivided one-fourth (¼) right, title and interest in and to the lease hereinabove described, said assignment to be effective from date of approval hereof by the Secretary of the Interior.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 5th day of November, 1954.

William J. Sherry (L.S.)
WILLIAM J. SHERRY

(OVER)

ADAPTED FROM FORM 5-154E

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Contract No. I-37-Ind-12897
Lease No. 3858

206 60807

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior has heretofore approved a certain oil and gas mining lease dated approved July 31, 1950, entered into by and between Birdie Lester Vance et vir

, Lessors,

and C. H. MURPHY, JR., Lessee, covering the following described lands in the Fort Peck Indian Reservation in the State of Montana, County of Roosevelt:

Township 28 North, Range 51 East M.P.M.
Sec. 10: NW/4; W/2 SW/4
Sec. 15: N/2 NW/4
Sec. 21: SE/4 NE/4

ACCEPTANCE BY ASSIGNEE

WHEREAS, the above described lease is subject to a certain Unit Agreement designated I-Sec. No. 869, approved by the Assistant Commissioner of Indian Affairs on August 22, 1951, and approved by the Acting Director of the United States Geological Survey on August 23, 1951; and

WHEREAS, by mesne assignments heretofore approved by the Secretary of the Interior, MARINE OIL COMPANY, an Arkansas Corporation, of El Dorado, Arkansas, is the present owner of an undivided interest in and to the above described lease.

NOW, THEREFORE, for and in consideration of ONE AND MORE dollars ($1.00), the receipt of which is hereby acknowledged, the said MARINE OIL COMPANY hereby transfers, assigns, and conveys an undivided one-fourth (¼) right, title and interest in and to said lease to WILLIAM J. SHERRY of Tulsa, Oklahoma, said assignment to be effective from date of approval hereof by the Secretary of the Interior.

IN WITNESS WHEREOF, the said assignor has hereunto set its hand and seal this 1st day of November, 1954.

MARINE OIL COMPANY

Attest: Assistant Secretary

By Vice President

(OVER)

206 60807

ADAPTED FROM
FORM 5-154B

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Contract No. I-37-Ind-12897
Our Lease No. 3858

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior has heretofore approved a certain oil and gas mining lease ~~dated~~ approved July 31, 1950, entered into by and between Birdie Lester Vance and Leroy Vance, wife and husband, lessors, and C. H. MURPHY, JR., lessee, covering the following described lands in the Fort Peck Indian Reservation in the State of Montana, County of Roosevelt:

Township 28 North, Range 51 East M.P.M.
Sec. 10: NW/4; W/2 SW/4
Sec. 15: W/2 NW/4
Sec. 21: SE/4 NE/4

WHEREAS, the above-described lease is subject to a certain Unit Agreement designated I-Sec. No. 869, approved by the Assistant Commissioner of Indian Affairs on August 22, 1951, and approved by the Acting Director of the United States Geological Survey on August 23, 1951;

AND WHEREAS, the Secretary of the Interior has heretofore approved an assignment of an undivided interest in the above-described lease from the said C. H. MURPHY, JR., to MURPHY CORPORATION, a Louisiana Corporation of El Dorado, Arkansas;

NOW, THEREFORE, for and in consideration of TEN AND MORE dollars ($10.00), the receipt of which is hereby acknowledged, the said MURPHY CORPORATION hereby bargains, sells, transfers, assigns, and conveys, an undivided one-fourth (¼) right, title and interest in and to said lease to MARINE OIL COMPANY, an Arkansas Corporation, of El Dorado, Arkansas. Said assignment to be effective from date of approval hereof by the Secretary of the Interior.

IN WITNESS WHEREOF, the said assignor has hereunto set its hand and seal, this 16th day of July, 1954.

MURPHY CORPORATION

Attest: Donald L. Durrett
Assistant Secretary

By _____
Exploration Manager

(OVER)

ADAPTED FROM FORM 5-154B

206 66807

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Contract No.

I-37-Ind-12897
Our Lease No. 3858

ASSIGNMENT OF MINING LEASE

WHEREAS, the Secretary of the Interior has heretofore approved a certain oil and gas mining lease dated approved July 31, 1950, entered into by and between Birdie Lester Vance and Leroy Vance, wife and husband, lessors,

and C. H. MURPHY, JR. lessee, covering the following described lands in the Fort Peck Indian Reservation in the State of Montana, County of Roosevelt:

18379

Township 28 North, Range 51 East M.P.M.
Sec. 10: NW¼, W½ SW¼
Sec. 15: W½ NW¼
Sec. 21: SE¼ NE¼

AND WHEREAS, the above-described lease is subject to a certain Unit Agreement designated I-Sec. No. 869, approved by the Assistant Commissioner of Indian Affairs on August 22, 1951, and approved by the Acting Director of the United States Geological Survey on August 23, 1951:

NOW, THEREFORE, for and in consideration of TEN AND MORE dollars ($10.00), the receipt of which is hereby acknowledged, the said C. H. MURPHY, JR., the owner of the above-described lease, hereby bargains, sells, transfers, assigns and conveys all of his right, title and interest in and to said lease, subject to the approval of the Secretary of the Interior, to MURPHY CORPORATION, a Louisiana Corporation of El Dorado, Arkansas, an undivided fifteen thirty-seconds (15/32) interest; to PLACID OIL COMPANY, a Delaware Corporation of Shreveport, Louisiana, an undivided one-half (½) interest; and to WILLIAM C. NOLAN AND THEODOSIA M. NOLAN of El Dorado, Arkansas, an undivided one thirty-second (1/32) interest; said assignment to be effective from date of approval hereof by the Secretary of the Interior.

IN WITNESS WHEREOF, the said assignor has hereunto set his hand and seal, this 21st day of July, 1952.

C. H. MURPHY, JR.

(OVER)

206 60807 Contract No. I-37ind- [redacted]

Form 5-154 h
(May 1949)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

12897
3858

OIL AND GAS MINING LEASE—ALLOTTED INDIAN LANDS

Assiniboine-Sioux TRIBE, STATE OF Montana

THIS INDENTURE OF LEASE, made and entered into in quintuplicate this ..... day of ....., 19....., by and between Birdie Lester Vance and Leroy Vance,

wife and husband

2224½ E. 11th St.
of Los Angeles, State of California, allottee No. 2847

(roll No. .....), of the Sioux Tribe of Indians, designated herein as lessor, and C. E. Murphy Jr.

of El Dorado, State of Arkansas, herein designated as lessee:

WITNESSETH

1. Lessor, in consideration of a cash bonus of $ 4269.60, paid to the Superintendent of the Indian Agency having jurisdiction, hereinafter called the superintendent, receipt of which is hereby acknowledged, and in consideration of rents and royalties to be paid, and the covenants to be observed as herein set forth, does hereby grant and lease to the lessee the exclusive right and privilege to drill for, mine, extract, remove, and dispose of all the oil and natural gas deposits in or under the following-described tracts of land situated in the county of Roosevelt, State of Montana, and more particularly described as follows:

Township 28 North, Range 51 East M.P.M.

Sec 10 - NE¼, NE¼SE¼
Sec 15 - W½NW¼
Sec 21 - SE¼NE¼

containing 260 acres more or less, together with the right to construct and maintain thereupon all works, buildings, plants, waterways, roads, telegraph and telephone lines, pipe lines, reservoirs, tanks, pumping stations, or other structures necessary to the full enjoyment hereof for the term of 10 years from and after the approval hereof by the Secretary of the Interior and as much longer thereafter as oil and/or gas is produced in paying quantities from said land.

2. The term "oil and gas supervisor" as employed herein shall refer to such officer or officers as the Secretary of the Interior may designate to supervise oil and gas operations on Indian lands. The term "superintendent" as used herein shall refer to the superintendent or other official in charge of the Indian Agency having jurisdiction over the lands leased.

3. In consideration of the foregoing, the lessee hereby agrees:

(a) Bond.—To furnish such bond as may be required by the regulations of the Secretary of the Interior, with satisfactory surety, or United States bonds as surety therefor, conditioned upon compliance with the terms of this lease.

(b) Wells.—(1) To drill and produce all wells necessary to offset or protect the leased land from drainage by wells on adjoining lands not the property of the lessor, or in lieu thereof, to compensate the lessor in full each month for the estimated loss of royalty through drainage: *Provided*, That during the period of supervision by the Secretary of the Interior, the necessity for offset wells shall be determined by the oil and gas supervisor and payment in lieu of drilling and production shall be with the consent of, and in an amount determined by the Secretary of the Interior; (2) at the election of the lessee to drill and produce other wells: *Provided*, That the right to drill and produce such other wells shall be subject to any system of well spacing or production allotments authorized and approved under applicable law or regulations, approved by the Secretary of the Interior and affecting the field or area in which the leased lands are situated; and (3) if the lessee elects not to drill and produce such other wells for any period the Secretary of the Interior may, within 10 days after due notice in writing, either require the drilling and production of such wells to the number necessary, in his opinion, to insure reasonable diligence in the development and operation of the property, or may in lieu of such additional diligent drilling and production require the payment on and after the first anniversary date of this lease of not to exceed $1 per acre per annum, which sum shall be in addition to any rental or royalty hereinafter specified.

16—17803-8

7. **Removal of buildings, improvements, and equipment.**—Lessee shall be the owner of and shall have the right to remove from the leased premises, within 90 days after termination of this lease, any and all buildings, structures, casing, material, and/or equipment placed thereon for the purpose of development and operation hereunder, save and except casing in wells and other material, equipment, and structures necessary for the continued operation of wells producing or capable of being produced in paying quantities as determined by the Secretary of the Interior, on said leased land at the time of surrender of this lease or termination thereof; and except as otherwise provided herein, all casing in wells, material, structures, and equipment shall be and become the property of the lessor.

8. **Relinquishment of supervision by the Secretary of the Interior.**—Should the Secretary of the Interior, at any time during the life of this instrument, relinquish supervision as to all or part of the acreage covered hereby, such relinquishment shall not bind lessee until said Secretary shall have given 30 days written notice. Until said requirements are fulfilled, lessee shall continue to make all payments due hereunder as provided in section 3 (*c*). After notice of relinquishment has been received by lessee, as herein provided, this lease shall be subject to the following further conditions:

(*a*) All rentals and royalties thereafter accruing shall be paid in the following manner: Rentals and royalties shall be paid directly to lessor or his successors in title, or to a trustee appointed under the provisions of section 9 hereof.

(*b*) If, at the time supervision is relinquished by the Secretary of the Interior, lessee shall have made all payments then due hereunder, and shall have fully performed all obligations on its part to be performed up to the time of such relinquishment, then the bond given to secure the performance hereof, on file in the Indian Office, shall be of no further force or effect.

(*c*) Should such relinquishment affect only part of the acreage, then lessee may continue to drill and operate the land covered hereby as an entirety: *Provided*, That lessee shall pay in the manner prescribed by section 3 (*c*), for the benefit of lessor such proportion of all rentals and royalties due hereunder as the acreage retained under the supervision of the Secretary of the Interior bears to the entire acreage of the lease, the remainder of such rentals and royalties to be paid directly to lessor or his successors in title or said trustee as the case may be, as provided in subdivision (*a*) of this section.

9. **Division of fee.**—It is covenanted and agreed that should the fee of said land now or hereafter be divided into separate parcels, held by different owners, or should the rental or royalty interests hereunder be so divided in ownership, the obligations of lessee hereunder shall not be added to or changed in any manner whatsoever save as specifically provided by the terms of this lease. Notwithstanding such separate ownership, lessee may continue to drill and operate said premises as an entirety: *Provided*, That each separate owner shall receive such proportion of all rentals and royalties accruing after the vesting of his title as the acreage of the fee, or rental or royalty interest, bears to the entire acreage covered by the lease, or to the entire rental and royalty interest as the case may be: *Provided further*, That if, at any time after departmental supervision hereof is relinquished, in whole or in part, there shall be four or more parties entitled to rentals or royalties hereunder, whether said parties are so entitled by virtue of undivided interests or by virtue of ownership of separate parcels of the land covered hereby, lessee, at his election may withhold the payment of further rentals or royalties (except as to the portion due the Indian lessor while under restriction), until all of said parties shall agree upon and designate in writing and in a recordable instrument a trustee to receive all payments due hereunder on behalf of said parties and their respective successors in title. Payments to said trustee shall constitute lawful payments hereunder, and the sole risk of an improper or unlawful distribution of said funds by said trustee shall rest upon the parties naming said trustee and their respective successors in title.

10. **Drilling and producing restrictions.**—It is covenanted and agreed that the Secretary of the Interior may impose restrictions as to time or times for the drilling of wells and as to the production from any well or wells drilled when in his judgment such action may be necessary or proper for the protection of the natural resources of the leased land and the interests of the Indian lessor, and in the exercise of his judgment the Secretary may take into consideration, among other things, Federal laws, State laws, or regulations by competent Federal or State authorities or lawful agreements among operators regulating either drilling or production, or both.

11. **Unit operation.**—The parties hereto agree to subscribe to and abide by any agreement for the cooperative or unit development of the field or area, affecting the leased lands, or any pool thereof, if and when collectively adopted by a majority operating interest therein and approved by the Secretary of the Interior, during the period of supervision.

12. **Helium—public emergency.**—It is covenanted and agreed that helium gas, carbon dioxide gas, and all other natural gases are included under the term "gas" as used in this lease; and in the event gas is discovered containing helium the United States Government shall have the right to purchase, at reasonable prices, all or any part of the production and to regulate the amount and manner of production; and in time of war or other public emergency, the United States Government shall have the option to purchase all or any part of the products produced under this lease.

13. **Conservation.**—The lessee in consideration of the rights herein granted agrees to abide by the provisions of any act of Congress, or any order or regulation prescribed pursuant thereto, relating to the conservation, production, or marketing of oil, gas, or other hydrocarbon substances.

14. **Heirs and successors in interest.**—It is further covenanted and agreed that each obligation hereunder shall extend to and be binding upon, and every benefit hereof shall inure to, the heirs, executors, administrators, successors of, or assigns of the respective parties hereto.

IN WITNESS WHEREOF, the said parties have hereunto subscribed their names and affixed their seals on the day and year first above mentioned.

Two witnesses to execution by lessor:

Marjorie N. Boyd

P. O. Poplar, Montana

Lucie Redbird

P. O. Brockton, Mont.

X Birdie Lester Vance [SEAL]
Birdie Lester Vance

X Leroy Vance [SEAL]
Leroy Vance

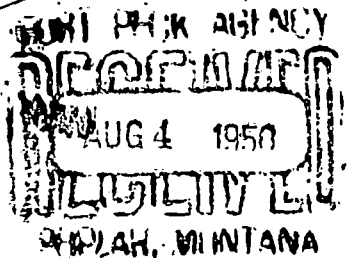
16—17803-3

206 60807

Supt. Dickl

Supt. H. Peck

Agency



PERMIT
APPLICATIONS

Epx #1
PApplm.
4 pages

1951 – 1959

Copy to Platt

Budget Bureau No. 42-R358.1.
Approval expires 11-30-49.

Form 9-331a
(March 1948)

RECEIVED

AUG 23 1951

OIL CONSERVATION BOARD AND BOARD OF RAILROAD COMMISSIONERS
BILLINGS

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Office _____
Lease No. I-37-Ind-12892
Unit East Poplar

RECEIVED
AUG 22 1951
GEOLOGICAL SURVEY
BILLINGS, MONTANA

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL	X	SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF REDRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

August 20, 1951

Well No. 1 is located 1980 ft. from {N/S} line and 1980 ft. from {E/W} line of sec. 2

NE/4 Sec 2 (¼ Sec. and Sec. No.) | 28N (Twp.) | 51E (Range) | (Meridian)

Wildcat (Field) | Roosevelt (County or Subdivision) | Montana (State or Territory)

The elevation of the derrick floor above sea level is _____ ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Will set 13 3/8" O.D. 48-lb. H-40 surface casing between 750' and 1000' and cement with 500 sax or returns to surface. Proposed depth is 4500' to test the Dakota-Lakota formation. If at the above depth, we believe the structure to be favorable, then we probably will drill on to test the Devonian formation believed to be above 8500'. 5 1/2" casing of proper weight and grade will be run to total depth of any formation thought to be productive.

Expected stratigraphic section:

Judith River	top @	1150
Muddy Sandstone	"	3285
Morrison	"	3960
Amsden	"	4710
Devonian	"	6900

APPROVED SUBJECT TO CONDITIONS SHOWN ON REVERSE

DATE 8-27-51

DISTRICT ENGINEER

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company C. R. Murphy, Jr.

Address 302 U. S. National Bank Bldg.

Denver 2, Colorado

By Harold Milam
Harold Milam

Title District Production Supt.

U. S. GOVERNMENT PRINTING OFFICE 16-8437-3

CONDITIONS OF APPROVAL

1. The lessee or operator shall mark the derrick or well in a conspicuous place with the name of the operator, well number, name of lessor, contract number, and location of the well and shall take all necessary precautions to preserve these markings.

2. A conductor or surface string of casing shall be run and cemented from bottom to surface unless other procedure is expressly authorized by this approval. The conductor or surface string shall be of sufficient weight and length and have installed thereon the proper and necessary high pressure fittings and equipment to keep the well under control in case an unexpected flow of gas, oil or water is encountered.

3. All showings of oil or gas are to be adequately tested for their commercial possibilities. All showings shall be properly protected by mud, cement or casing so that each showing will be confined to its original stratum. Necessary precautions shall be taken to prevent waste or damage to other minerals drilled through and the U. S. Geological Survey, upon request, shall be furnished with carefully taken samples of such minerals as coal, potash and salt.

4. Lessee's Monthly Report of Operations (Form 9-329a) shall be filed in triplicate with the office of the U. S. Geological Survey, P. O. Box 400, Casper, Wyoming, not later than the sixth of the succeeding month. The report should show for this well any change of status occurring within the particular month such as date drilling commenced, suspended, resumed or completed, total depth as of the end of the month, and if shut down the reason therefore.

5. 4 copies of the log of this well on Form 9-330, or other acceptable form and two copies of all electrical logs, directional, diameter and temperature surveys of the hole shall be filed with the district engineer within 15 days after such information is received by operator or completion of the well which ever is earlier.

6. The District Engineer, H. H. PERRIGO P. O. BOX 1435 BILLINGS, MONTANA, shall be notified on Form 9-331b in triplicate giving thereon all necessary details of the proposed operation or test for proper consideration and action sufficiently in advance of making casing or formation tests, shooting or acidizing, running or cementing casing, other than the surface or conductor string, to permit approval of the notice prior to date of proposed work.

Form No. 2

GENERAL RULES
201, 202, 213,
216, 219, 233.1

(SUBMIT IN QUADRUPLICATE)

TO

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA
BILLINGS OR SHELBY

NOTICE!
THIS FORM BECOMES A PERMIT WHEN STAMPED APPROVED BY AN AGENT OF THE COMMISSION.

RECEIVED

FEB 18 1957

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA

SUNDRY NOTICES AND REPORT OF WELLS

Notice of Intention to Drill		Subsequent Report of Water Shut-off	
Notice of Intention to Change Plans		Subsequent Report of Shooting, Acidizing, Cementing	
Notice of Intention to Test Water Shut-off		Subsequent Report of Altering Casing	
Notice of Intention to Redrill or Repair Well		Subsequent Report of Redrilling or Repair	
Notice of Intention to Shoot, Acidize, or Cement		Subsequent Report of Abandonment	
Notice of Intention to Pull or Alter Casing		Supplementary Well History	
Notice of Intention to Abandon Well		Report of Fracturing	
		Workover History	X

(Indicate Above by Check Mark Nature of Report, Notice, or Other Data)

February 12, 1957, 19

Following is a { notice of intention to do work / report of work done } on land { owned / leased } described as follows:

LEASE No. 1-37-Ind-12892

MONTANA (State) Roosevelt (County) East Poplar (Field)

Well No. 1 SW NE Section 2 (m. sec.) T28N, (Township) R51E (Range) (Meridian)

The well is located 1980 ft. from { N / ~~S~~ } line and 1980 ft. from { E / W } line of Sec. 2

(Locate accurately on Plat on back of this form the well location, and show lease boundary.)

The elevation of the derrick floor above the sea level is 2123'

READ CAREFULLY — **DETAILS OF PLAN OF WORK** — READ CAREFULLY

(State names of and expected depths to objective sands; show size, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work, particularly all details results Shooting, Acidizing, Fracturing.)

DETAILS OF WORK
RESULT

SEE ATTACHED SHEETS

USGS approved 2-14-57

Approved subject to conditions on reverse of form

Date 2-15-57

By [signature]
Title
District Office Agent

Company Murphy Corporation

By [signature]

Title Field Production Supt.

Address Poplar, Montana

NOTE:—Reports on this Form to be submitted to the District Agent for Approval in Quadruplicate.

10M--1-58

OVER

Form No. 2
GENERAL RULES
201, 202, 213,
216, 219, 233.1

(SUBMIT IN QUADRUPLICATE)
TO

OIL AND GAS CONSERVATION COMMISSION OF THE STATE OF MONTANA
BILLINGS OR SHELBY

NOTICE!
THIS FORM BECOMES A PERMIT WHEN STAMPED APPROVED BY AN AGENT OF THE COMMISSION

RECEIVED
JAN 7 - 1960
OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA

SUNDRY NOTICES AND REPORT OF WELLS

Notice of Intention to Drill		Subsequent Report of Water Shut-off	
Notice of Intention to Change Plans		Subsequent Report of Shooting, Acidizing, Cementing	
Notice of Intention to Test Water Shut-off		Subsequent Report of Altering Casing	
Notice of Intention to Redrill or Repair Well		Subsequent Report of Redrilling or Repair	
Notice of Intention to Shoot, Acidize, or Cement		Subsequent Report of Abandonment	
Notice of Intention to Pull or Alter Casing		Supplementary Well History	
Notice of Intention to Abandon Well		Report of Fracturing	
		Workover History	X

(Indicate Above by Check Mark Nature of Report, Notice, or Other Data)

December 29, 19 59

Following is a {~~notice of intention to do work~~ / report of work done} on land {~~XXXXX~~ / leased} described as follows:

LEASE 1-37-Ind-12892

MONTANA (State) — Roosevelt (County) — East Poplar (Field)

Well No. 1 — SWNE Section 2 (m. sec.) — 28N (Township) — 51E (Range) — M.P.M. (Meridian)

The well is located 1980 ft. from {N / XXX} line and 1980 ft. from {E / XXX} line of Sec. 2

(Locate accurately on Plat on back of this form the well location, and show lease boundary.)

The elevation of the derrick floor above the sea level is 2123'

READ CAREFULLY — **DETAILS OF PLAN OF WORK** — READ CAREFULLY

(State names of and expected depths to objective sands; show size, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work, particularly all details results Shooting, Acidizing, Fracturing.)

DETAILS OF WORK
RESULT

See attached sheets.

RECEIVED
JAN 4 1960
OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA · BILLINGS

G. S. G. S. approved 1-5-60
Approved subject to conditions on reverse of form

Date 1-6-60

By [signature] Title

District Office Agent

Company MURPHY CORPORATION

By [signature]

Title Field Production Superintendent

Address Poplar, Montana

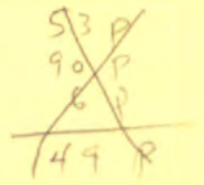
NOTE:—Reports on this Form to be submitted to the District Agent for Approval in Quadruplicate.

WHEN USED AS PERMIT TO DRILL, THIS EXPIRES 90 DAYS FROM DATE OF APPROVAL

OVER

GEOLOGICAL DATA

EPA #1



G. D.

149 P

1951 - 1952

Form 9-330

Budget Bureau No. 42-R355.2.
Approval expires 12-31-52.

BEST COPY AVAILABLE

RECEIVED

APR 8 1952

OIL CONSERVATION BOARD AND BOARD OF RAILROAD COMMISSIONERS
BILLINGS

U. S. Land Office Billings, Mont.
Serial Number 1-37-Ind-12092
Lease or Permit to Prospect East Poplar Unit

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
APR 8 1952
U.S. GEOLOGICAL SURVEY
BILLINGS, MONTANA

7

LOG OF OIL OR GAS WELL

LOCATE WELL CORRECTLY

Company C. H. Murphy, Jr. Address Box 76 Poplar, Montana

Lessor or Tract East Poplar Unit Field East Poplar Unit State Montana

Well No. 1 Sec. 2 T. 28N R. 51E Meridian M.P.M. County Roosevelt

Location 1980 ft. {N./S.} of N Line and 1980 ft. {E./W.} of E Line of Sec. 2 Elevation 2123'
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Harold Miller

Date April 5, 1952 Title District Production Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling Sept. 16, 1951 Finished drilling Feb. 19, 1952

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 5648 to 5680 No. 4, from to

No. 2, from 5799 to 5827 No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from 750 to 830 No. 3, from 5833 to 5880

No. 2, from 2170 to 2183 No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From	Perforated To	Purpose
13 3/8	48	8	Natl.	1013	Baker				Surface
7	26	8	Youngst.	5814	Larkin		5648	5680	Oil String
							5799	5814	Oil String

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13 3/8	1013	700	Pump & plug		
7	5814	200	Pump & plug		

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ..... Length ..... Depth set .....

Adapters—Material ..... Size .....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
1/2"	Bullets		90	3/4/52	5799-5814	
1/2	Jet Shots		128	3/6/52	5648-5680	

TOOLS USED

Rotary tools were used from 0 feet to 9163 feet, and from ..... feet to ..... feet

Cable tools were used from ..... feet to ..... feet, and from ..... feet to ..... feet

DATES

3 / 14, 19 52 Put to producing 3 / 13, 19 52

The production for the first 24 hours was 485 barrels of fluid of which 99 % was oil; 1 % emulsion; ..... % water; and ..... % sediment. Gravity, °Bé. .....

If gas well, cu. ft. per 24 hours ..... Gallons gasoline per 1,000 cu. ft. of gas .....

Rock pressure, lbs. per sq. in. 3200

EMPLOYEES

S. H. Williams, Driller T. P. Manion, Driller

W. W. Gill, Driller ....., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
753			Judith River
1145			Eagle
2005			Niobrara
2120			Carlisle
2350			Greenhorn
2544			Graneros
2677			Upper Muddy
2899			Muddy
2943			Skull Creek
3112			Dakota Silt
3505			Morrison
3898			Ellis
4077			Rierdon
4255			Piper Shale
4328			Piper Lime
4576			Spearfish
4706			Amsden
5130			Kibby
5395			Charles
5795			Madison (Mission Canyon)
6560			Lodgepole
7127			Englewood
7172			Three Forks
7280			Jefferson
9041			Ordovician Sand

FROM— TO— TOTAL FEET FORMATION

FORMATION RECORD—Continued

C. H. Murphy, Jr.
East Poplar Unit #1, Poplar Area, Roosevelt County, Montana
1980 S/N 1980 W/E 2-28N-51E Elev 2123
Spudded 9-16-51 Comp. 2-19-52

13 3/8" @ 1013 c/w 700 sx
7" @ 5814 c/w 200 sx
IP 485 BF, 99% oil

Sch. tops:

Judith River	753	
Eagle	1145	
Niobrara	2005	
Carlisle	2120	
Greenhorn	2350	
Graneros	2544	
Upper Muddy	2677	
Muddy	2899	
Skull Creek	2943	
Dak. silt	3112	
Morrison	3505	
Ellis	3898	
Rierdon	4077	
Piper Sh.	4255	
Piper lm.	4328	
Spearfish	4576	
Amsden	4706	
Kibbey	5130	
Charles	5395	
Madison	5795	(Mission Canyon)
Lodgepole	6560	
Englewood	7127	
Three Forks	7172	
Ordovician sd.	7341	
Jefferson	7280	

EPU #1 was spudded 9-16-51. A water flow was encountered from 750-830 and required the use of 11 # mud to kill the flow. 13 3/8" surface csg. was set at 1013' and cemented w/700 sx. An 8 3/4" hole was drilled to 5814' with cores and tests indicating oil production from 5799-5822' and from 5648-80'. The hole from 5814-22 was 6 1/8" core hole. 7" OD casing was set at 5814' and cemented w/200 sx. Salt water was found on a drill stem test from 5833-80'. Continuous coring with a 6 1/8" diamond bit carried the well to a total depth of 9163' where Electric logs and a Velocity survey were run.

The well was plugged back with cement to 5827' and casing perforated with 6 bullets per ft. from 5799-5814 and 5648-80. A Baker model "D" packer was set by wire line method at 5750' separating the two zones. 2½" tubing was run and seated in the packer. The well was allowed to flow with the upper zone flowing through the casing and the lower zone through the tubing.

Production after cleaning into burning pits was 252 bbls. oil per 24 hrs. on an 8/64" choke and 800# surface pressure thru the tubing and 233 bbls. oil on a 10/64" choke and 525# surface pressure thru the casing.

1-11-52 Drilling 7950 (FCP)

1-18-52 Coring 8008, Sample Tops: Jud River 1025; Morrison 3595; Piper 4250; Tensleep 4575; Amsden 4705; Kibbey 5160; Water, Sulphur, at 5833; Charles 5320? Mission Canyon 5640 (FCP)

1-25-52 Coring 8289 (FCP)

2-21-52 Comp 2-20-52, Devonian 7194, Ordovician 8454? T.D. 9163; Will plug back and test Charles and Madison (FCP)

3-1-52 T.D. 9163, PB to 5830, starting to test (FCP)

3-7-52 PB to 5827, DST 5814-27 open 8 hrs. SI none; Rec 3367' fluid, 900' light mud, 2467' stiff mud w/ abundance free oil, 90' free oil; FBHF 1400#, SI 2750#, testing (FCP)

3-14-52 Perf 5799-5814, 6 shots per foot; Perf 5648-80 4 shots per ft. Perf 5814-27 (open hole) 6 shots per ft. Baker production packer set at 5750, flowed 354 BOPD thru 1/8" choke from 5750-5827 and 232 BOPD thru 10/64" choke from 5648-5750, tubing pressure 800#, casing pressure 525# (FCP) Comp 2-20-52

Confidential
Rec'd from Joe Seymour
of Phillips 4-15-52

C
O
P
Y

PHILLIPS PETROLEUM COMPANY
March 28, 1952

EAST POPLAR #1

C. H. Murphy, Jr., et al #1 East Poplar Unit, C SW NE, Section 2, T-28N, R. 51E, Roosevelt County, Montana.

Elevation - 2111 Ground, 2123 Kelly Bushing.
Commenced - 9/15/51
Completed - 3/ /52
Casing Record - 13-3/8" @ 1013' w/700 sx. 7" @ 5814' w/200 sx.
Schlumberger Tops - Judith River 752, Claggett 860, Eagle 1145, Niobrara 2005, Carlile 2120, Green Horn 2350, Upper Muddy 2677, Lower Muddy 2898, Skull Creek 2933, Dakota Silt 3112, Dakota 3178, Kootenai 3217, Second Cat Creek 3315, Third Cat Creek 3444, Morrison 3505, Ellis 3898, Rierdon 4077, Piper Shale 4255, Piper Lime 4328, Gypsum Springs 4376, Spearfish (?) 4575, Amsden 4706, Heath 4835, Otter 4938, Kibbey 5130, Charles 5395, Mission Canyon 5940 (?), Lodgepole 6560, Kinderhook 7127, Three Forks 7170, Jefferson 7280, Ordovician 8185 (?), Lower Ordovician Sand 9041.
Total Depth 9163.
Plugged Back 5827

DST 2904-2921, 1/2" x 3/8" chokes, 500' water cushion, open 15 min., closed 10 min, rec. 500' water cushion, 300' brackish water, slightly mud cut with trace oil and gas, FP 150-165#, SIP 1150#, HP 1450#.
DST 4772-86, 3/8" x 3/8" chokes, 500' water cushion, op 30 min., very weak blow for 25 min., no blow for 5 min., no shut in attempted, rec 500' water cushion and 85' brackish water (salt 3800 ppm) and 30' oil and gas cut mud (oil 41°) and approximately 1 qt. free oil, FP 200-200#, HP 2700#.
DST 5170-83, 1/4" x 1/4" chokes, no water cushion, open 20 min., closed 10 min. rec. 2240' fluid, 40' RHM and 2200 SW, slightly cut with oil and gas, FP 250-1100#, HP 2900#.
DST 5664-82, 1/4" x 1/4" chokes, 500' wtr cushion, open 20 min., SI 8 min., packer gave way at end of 8 min., fair blow throughout, rec 4185' total fluid; 500' water cushion, 500' oil and gas cut mud, 3185', 38.3° gravity green oil with slight sulphur odor. FP 1600-2000#, SIP 2600#, HP 3075#
DST 5814-22, 4/8" x 1/4" chokes, 961' water cushion, packer set at 5745 in casing. Water Cushion to surface in 38 min., mud to surface in 1 hr. 28 min., oil to surface in 1 hr. 47 min., gauged 33.06 barrels 1st hr., 18.24 next 30 min., top flowing pressure 1/4" choke, 250#, SI-15 min., Tp 750#. Opened tool 1 hr., flowed 26.22 bbls. 3/16" top choke, TP 450#, SIP 800#, FP (1/4") 1250-2435#, FP (3/16") 2680#, FP (1/8") 2309#, SIP 3001#, HP 3200#. (Shut in 4 hrs.)
DST 5833-80, 5/8" x 1/4" chokes, no water cushion, gas to surface in 2 hrs. 20 min., mud to surface in 2 hrs. 40 min., flowed mud, oil and gas cut sulphur water, no gauge, TFP 8#, SI 10 min., TSIP 560#, Broke circ, disc., reversed out fluid in tubing, fluid being mud, oil and gas cut sulphur water, fluid from bottom of tubing was black sulphur water w/little gas, FP 50-2420#, SIP 2940#, HP 3040#.

(continued next page)

DST 5918-26, 5/8" x 1/4" chokes, no water cushion, tool open 25 min., rec. slight blo for 2 min., reset tool 5 times, rec 640' mud, no trace of oil or water, FP 0-320#, SIP 2905#, HP 3260#

DST 5939-5960, 5/8" x 1/4" chokes, no water cushion, open 2 hrs., closed 20 min., mud to surface in 31 min., sulphur water to surface in 1 hr. 51 min., TFP ¼" choke 165#, TFP 1" choke 35#, TSIP 425#, HP 3050#, FP 2035-2850#, SIP 3055#.

DST 6077-6145, 5/8" x 1/4" chokes, no water cushion, open 3 hrs., closed 30 min., weak, steady blow for 2 hrs, very weak blow for 1 hr., no gas to surface (shear pin in circ. stub sheared while coming out of hole which let fluid in or out of drill, depending on relative height of fluid in drill pipe and between drill pipe and casing.) Recovery brought to surface 90' sulphur water with very slight rainbow, which 90' was below circ. stub., FP 90-670#, SIP 3125#, HP 3405#.

DST 7307-36, 1/2" x 1/4" chokes, no water cushion, open 42 min., closed 15 min., flowed mud and salt water after 34 min., TFP ¼" choke 180#, FP 1400-3600#, SIP 3700#, HP 4100#.

DST 7345-54, XXXX 3/8" x 1/4" chokes, no water cushion, straddle packer test; TD 7394', open 30 min., SI 15 min., opened with good blow, died to weak bubble after 25 min., rec. 910' mud and salt wtr., slightly gas cut, FP 0-320#, SIP 3615#, HP 3995#.

Plugged Back 5844

DST 5830-5844, packers failed.

DST 5837-5844, 1/2" x 3/4" chokes, no water cushion, packers gave way.

Plugged Back 5827

DST 5812-27, 5/8" x 1/4" chokes, no water cushion, tool open 8 hrs. 17 min., weak blo, tool plugged, reset tool 7 times, rec 3367' fluid, 900' light mud, 2967' mud with abundance of free oil on bottom, 90' free oil, FP 50-100#, SIP 2750#, HP 3000#.

DST 5814-5827, 5/8" bottom, no top choke, tool open 45 hrs., fluid to surface in 23 hrs., flowed mud and oil at approx. 150 barrels per day for 22 hrs., FP 230-2380#, HP 3205#. Perforated 5799-5814 with 90 shots

DST 5799-5827, 1/2" x 1/8" top chokes, no water cushion, fluid to surface in 2 hrs. 47 min., production estimated at 300 BOPD with 600# top pressure, FP 1800-3100#, SIP 3100#. Perforated 5648-5680 with 4 shots per fott.

DST 5636-5689, gas to surface in 6 min., oil to surface in 38 min., TFP ¼" 340#, TFP 1/8" 830#, top closed in pressure 960#, Calculated 625 BOPD on 1/4" choke, Calculated 400 BOPD on 1/8" choke, Basic Sediment 2/10 of 1%, SI 1 hr. Corrected Gravity 40.6°, FP 1100-2975#, SIP 3200#.

Location: C SW SW [illegible] Sec. [illegible]
Spacing - 160
Elevation: [illegible]
Spudded: [illegible]
Completed: [illegible]
T.D.: 9127' Schl., Cored to 9163'
Prod. Zones: B-1 and B-2 (5640-5680')
C (5799-5814')
Open Hole (5814-5827')

Schlumberger Tops

	Depth	Datum	Thickness
Judith River	753	+1370	
?**Greenhorn	2350	- 227	
Muddy Sd	[illegible]	- 777	
Dakota Silt	3112	- 989	
Piper Ls	4330	-2207	
?**Amsden	4700	-2577	
Heath	4832	-2709	
Otter	4994	-2871	
*Kibbey Sd	5130	-3007	
Kibbey Ls	5287	-3164	
Madison	5395	-3272	
**A-1	5483	-3359	3'
**A-2	5499	-3376	2'
**A-3	5519	-3396	8'
**A-4	5532	-3409	22'
B-1	5649	-3526	10'
B-2	5662	-3539	16'
*B-3	5706	-3583	8'
*B-4	5719	-3596	5'
B-5	5755	-3632	?
**C-1	5789	-3666	?
*C-2	5800	-3677	14'
*Mission Canyon	5816	-3693	
*Lodgepole	6570	-4447	
Bakken	7162	-5039	
3 Forks	7200	-5077	
*Nisku Porosity	7308	-5185	52'

Coring Intervals:

1 2367-2375 Rec. 8' Greenhorn
2 4776-4786 Rec. 8' Amsden
3 5174-5184 Rec. 10' Kibbey Sand
4 5184-5223 Rec. 39' Kibbey Sand
5 5682-5692 Rec. 10' B-3
(Side Wall Cores)
5536-5554 A-4
5649-5657 B-1
4946 Heath
5667-5680 B-2
6 5695-5752 B-2
7 5753-5800 Rec. 47' B-5
8 5810-5818 Rec. 8' C-2
9 5822-5830 Rec. 8' Mission Canyon
#10 5830-5880 Rec. 49'
#11 5881-5899½ Rec. 18'6"
#12 5900-5915 Rec. 15'
#13 5915-5926 Rec. 10½'
#14 5926-5936 Rec. 10'
#15 5936-5960 Rec. 24'
#16 5962-5995 Rec. 30'
#17 5995-6009 Rec. 14'
#18 6009-6034 Rec. 25'
#19 6034-6090 Rec. 56'
#20 6090-6145 Rec. 55'
#21 6147-6203 Rec. 56'
#22 6203-6258 Rec. 55'
#23 6258-6314 Rec. 55'
#24 6314-6372 Rec. 58'
#25 6372-6430 Rec. 58'
#26 6430-6488 Rec. 58'
#27 6468-6528 Rec. 40'
#28 6530-6588 Rec. 58' Lodgepole
#29 6588-6646 Rec. 58'
#30 6646-6704 Rec. 58'
#31 6704-6762 Rec. 58'
#32 6762-6821 Rec. 59'
#33 6821-6879 Rec. 58'
#34 6879-6937 Rec. 58'
#35 6937-6995 Rec. 58'
#36 6995-7035 Rec. 40'
#37 7035-7075 Rec. 39'
#38 7078-7136 Rec. 55'
#39 7136-7194 Rec. 60' Bakken
#40 7194-7252 Rec. 58' Three Forks
#41 7252-7310 Rec. 58'
#42 7310-7320 Rec. 11' Nisku
#43 7321-7336 Rec. 15'
#44 7336-7395 Rec. 58' Duperow
#45 7400-7458 Rec. 58'
#46 7458-7516 Rec. 58'
#47 7516-7557 Rec. 41'
#48 7557-7599 Rec. 42'
#49 7599-7657 Rec. 58'
#50 7659-7717 Rec. 58'
#51 7718-7776 Rec. 58'
#52 7776-7834 Rec. 58'
#53 7834-7891 Rec. 57'
#54 7891-7949 Rec. 58'
#55 7949-8008 Rec. 59'
#56 8010-8068 Rec. 56'
#57 8068-8126 Rec. 58'
#58 8126-8162 Rec. 36'
#59 8166-8220 Rec. 54'
#60 8220-8278 Rec. 58'
#61 8278-8336 Rec. 57'
#62 8336-8356 Rec. 17'
#63 8356-8406 Rec. 50'
#64 8406-8419 Rec. 9'
#65 8419-8477 Rec. 58'
#66 8477-8535 Rec. 58'
#67 8535-8555 Rec. 20'
#68 8555-8566 Rec. 7'
#69 8566-8622 Rec. 58'

Schlumberger Tops (Continued)

	Depth	Datum	Thickness
*Duperow	7360	-5237	
Souris River	7780	-5657	
Dawson Bay	8020	-5897	
Prairie Evaporites	8084	-5961	
Prairie Carbonate	8105	-5982	
Interlake	8178	-6055	
Gunton	8565	-6442	
Stony Mountain	8668	-6545	
Red River	8695	-6572	
Winnepeg	9070	-6947	
Winnepeg Sand	9100	-6977	

**Probable prod. Zones (From DST structural position, ect.

*Shows (Drill Pipe Corrections (Made)

2364 Driller = 2367 SLM +3'
2914 Driller = 2921 SLM +7'
4772 Driller = 4778 SLM +2'
5692 Driller = 5694 SLM +2'

#70 8622-8680 Rec. 58'
#71 8680-8686 Rec. 6'
#72 8686-8737 Rec. 51'
#73 8737-8795 Rec. 56'
#74 8795-8846 Rec. 51'
#75 8846-8874 Rec. 19'
#76 8875-8933 Rec. 58'
#77 8933-8992 Rec. 59'
#78 8992-9047 Rec. 55'
#79 9047-9055 Rec. 8'
#80 9055-9059 Rec. 3'
#81 9059-9065 Rec. 5'
#82 9064-9088 Rec. 24'
#83 9088-9102 Rec. 14'
#84 9102-9108 Rec. 6'
#85 9108-9112 Rec. 4'
#86 9012-9020 Rec. 8'
#87 9120-9121 Rec. 6"
#88 9121-9127 Rec. 5'
#89 9127-9137 Rec. 11'
#90 9137-9145 Rec. 7'
#91 9145-9153 Rec. 8'
#92 9153-9154 No Recovery
#93 9154-9163 Rec. 10' (picked up 1' of previous core).

Drill Stem Tests:

DST #1 2904-2921 Muddy Sand
DST #2 4772-4786 Amsden
DST #3 5170-5183 Kibbey Sand Porosity
DST #4 5664-5682 B-2
DST #5 5814-5822 C-2
DST #6 5833-5880 Mission Canyon
DST #7 5918-5926 Mission Canyon
DST #8 5939-5960 Mission Canyon
DST # 9 6077-6145 Mission Canyon
DST #10 7307-7336 Nisku
DST #11 7345-7354 Nisku
DST #12 5830-5844 Mission Canyon
DST #13 5834-5844 Mission Canyon
DST #14 5814-5827 C-2
DST #15 5814-5827 C-2
DST #16 5799-5827 C-2
DST #17 5648-5680 B-1 & B-2

History Subsequent to Completion:

None

COMPLETION DATA

EAST POPLAR UNIT WELL NO. 1

COMPLETION DATA

CASING PROGRAM: 9-21-51 1058' Ran 35 joints (998') of 13 3/8", H-40, 48#, R-2, 8rd thd., ST&C, Class "A" American casing. Landed 15' below R.K.B. and set at 1013'. Baker guide shoe at 1013'. Cemented with 700 sacks of regular cement. Plug down at 12:00 midnight, 9-21-51.

9-26-51 1058' Tested 13 3/8" casing with 800# for 60 minutes, held okay.

11-7-51 5819' Ran 1055.12' of N-80 and 4746.33' of J-55 (total of 5801.45') of 7", 23#, R-3, 8rd thd., ST&C, Class "A" American casing. Landed 12.30' below R.K.B. and set 5.25' off bottom at 5813.75'. Ran Larkin float shoe at 5813.75'; Larkin float collar at 5767.34'. Ran 3 Baker centralizers spaced at 5545', 5670', and 5680'. Cemented with 200 sacks of regular cement with 2 sacks of gel added to mixing water. 3 sacks gel, 25 lbs gel flake and 50 lbs of Micatex were added through hopper. Pumped plug down with 800# maximum pressure. Bumped plug with 1000#, released pressure and float held ok. Plug down at 8:15 P.M., 11-7-51.

11-12-51 5819' Tested 7" casing with 1150# for 30 minutes, held ok.

COMPLETION PROGRAM: 11-1-51 5819' T.D. Continued coring program from under 7" long string casing

2-20-52 9163' T.D. Reached the total depth of 9163' by almost continued coring from 5819' and ran logs.

2/21-24/52 9163' T.D. Plugged back to 5827' prior to beginning completion as follows:
Plug No. 1: 6050 to 5850' with 38 sacks cement. Found top of cement at 5961' and cored to 5963'. Plug No. 2: 5963 to 5850' with 30 sacks cement. Found top of cement at 5949'. Plug No. 3: 5949 to 5830' with 50 sacks cement. Found top of cement at 5906'. Set Baker Model "K" retainer at 5847'. Retainer held weight and pull, but when attempted to pump in formation, circulation broke around retainer apparently thru fractures. Pulled loose. Plug No. 4: 5906 to 5830' with 20 sacks cement. Drilled from 5830 to 5844 to run DST. Plug No. 5: 5844-5822' with 20 sacks cement. Found top of cement at 5827', PBTD

Perforated "C" Zone from 5799 to 5814' with 6 bullets per foot. Perforated the "B-1" and "B-2" Zones from 5648 to 5680' with 4 jet shots per foot. Ran Baker Model "D" production packer on wire line and set at 5750'. Ran 2 1/2" tubing and set in packer at 5750' in order to flow the "C" Zones through the tubing and the "B-1" and "B-2" Zones co-mingled through the casing. Initial production after cleaning into burning pits was:

"B-1" and "B-2" Zones co-mingled flowed 233 BOPD with .6 of 1% BS&W on a 10/64" choke with a casing-flow-pressure of 525#.
"C" Zone flowed 252 BOPD with .6 of 1% BS&W on an 8/64" choke with a tubing-flow-pressure of 800#.
Tested for communication between zones, none indicated.

ELECTRO LOG DATA

EAST POPLAR UNIT WELL NO. "1"

WELL LOG DATA

TYPE OF LOGS	INTERVAL LOGGED
Schlumberger Electrical Survey 2"	66'-9127'
Schlumberger Electrical Survey 5"	66'-9127'
Schlumberger Microlog 5"	5814'-9124'
Schlumberger Limestone Survey 5"	4650'-9124'
Schlumberger Temperature Survey 2"	3500'-5749'

LOG TOPS	Depth	Datum	Thickness
Judith River	753	(+1370)	
Eagle	1143	(+ 980)	
Niobrara	2005	(+ 118)	
Greenhorn	2350	(- 227)	
Graneros	2542	(- 419)	
Muddy Sandstone	2900	(- 777)	
Dakota Siltstone	3112	(- 989)	
Morrison	3504	(-1381)	
Swift	3567	(-1444)	
Vanguard	3897	(-1774)	
Rierdon	4075	(-1952)	
Piper Limestone	4330	(-2207)	
Gypsum Springs	4387	(-2264)	
Spearfish	4578	(-2455)	
Amsden	4700	(-2577)	
Heath	4832	(-2709)	
Otter	4994	(-2871)	
Kibbey Sandstone	5130	(-3007)	
Kibbey Limestone	5287	(-3164)	
Madison	5395	(-3272)	
A-1	5482	(-3359)	3'
A-2	5499	(-3376)	2'
A-3	5519	(-3396)	8'
A-4	5532	(-3409)	22'
B-1	5649	(-3526)	10'
B-2	5666	(-3543)	16'
B-3	5686	(-3563)	8'
B-4	5719	(-3596)	5'
B-5	5755	(-3632)	?
C-1	5789	(-3666)	?
C-2	5800	(-3677)	14'
Mission Canyon	5816	(-3693)	
Lodgepole	6570	(-4447)	
Bakken	7162	(-5039)	
3 Forks	7200	(-5077)	
Misha Porosity	7308	(-5185)	52'
Duperow	7360	(-5237)	
Souris River	7780	(-5657)	
Dawson Bay	8020	(-5897)	
Prairie Evaporites	8084	(-5961)	
Prairie Carbonate	8105	(-5982)	

Interlake	8178 (-6055)
Gunton	8565 (-6442)
Stony Mountain	8668 (-6545)
Red River	8695 (-6572)
Winnepeg	9070 (-6947)
Winnepeg Sand	9100 (-6977)

T. D. - 9127' Schlumberger = 9127' Driller

Cores #89 through #93 were cut after logs were run. Well bottomed at 9163'

DRILL STEM TEST RECORD

EAST POPLAR UNIT WELL NO. 1

DRILL STEM TESTS RECORD

DST #1: MUDDY SAND - 2904-2921' Used Halliburton tool. Ran 1/2" bottom choke and 3/8" top choke with 500' water cushion. Tool open for 15 minutes and closed for 10 minutes. Recovered 500' water cushion and 300' brackish formation water, trace of oil and gas. IBHFP 150#, FBHFP 165#, BHSIP 1150#, Hydro 1450#.

DST #2: AMSDEN - 4772-4786' Used Halliburton's tool. Ran 3/8" bottom choke and 3/8" top choke with 500' water cushion. Tool was open 30 minutes. Had a very weak blow for 25 minutes and no blow at all for 5 minutes. Recovered 500' water cushion, 85' of brackish water, and 30' of oil and gas cut mud. NaCl 38,000 PPM. IBHFP 200#, FBHFP 200#, Hydro 2700#.

DST #3: KIBBEY SAND POROSITY - 5170-5183' Used Halliburton tool, 1/4 x 1/4" chokes. Tool open 20 minutes, closed in 10 minutes. Recovered 2240' total fluid, 40' rat hole mud, 2200' salt water, slight cut with oil and gas, (oil 38.8o, salt water 43,000 PPM). IBHFP 250#, FBHFP 1100#, BHSIP none recorded, Hydro 2900#.

DST #4: "B-2" 5664-5682' with Halliburton tool, 1/4" x 1/4" chokes, 500' water cushion. Tool open 20 minutes, fair blow, closed 8 minutes. Recovered 4185' total fluid, 500' water cushion, and 500' oil and gas cut mud. 3185' of 38.3° green oil with slight sulphur odor, (Cl 6500 PPM off tool). IBHFP 800#, FBHFP 1800#, BHSIP 2800#, Hydro 3000#.

DST #5: "C-2" - 5814-5822' Packer set in 7" casing at 5745'. Halliburton tool, 5/8" bottom choke, 961' water cusion. Opened tool at 11:10 A.M., 11-13-51, received water to surface at 11:48 , mud at 12:35 and oil (40°gravity) at 1:13 P.M. Flowed well on 1/8" choke at the rate of 10.26 barrels per hour with 250# maximum top flowing pressure. Closed well in for eight hours total time and had 800# top shut in pressure. Pulled tool loose at 6:00, 11-14-51. IBHFP 1250#, FBHFP 2435#, BHSIP 3001#, Hydro 3200#.

DST #6: MISSION CANYON - 5833-5880' 5/8" bottom choke, 1/4" top choke, no water cushion. Tool open 4 hours, closed in 10 minutes for bottom hole pressure. Gas to surface 2 hours, 20 minutes; mud to surface 2 hours, 40 minutes. Top flowing pressure 8#, top closed pressure 560#. Flowed mud, oil and gas cut sulphur water. Cl 7,000 PPM. IBHFP 50#, FBHFP 2550#, BHSIP 3000#, Hydro 3325#.

DST #7: MISSION CANYON - 5918-5926' Used Halliburton's tool. 5/8" bottom choke and 1/4" top choke, no water cushion. Opened tool at 9:55 A.M., received slight blow for two minutes. Reset tool five times and received slight blow each time. Tool open one hour and fifteen minutes total time. Recovered 640' mud with no trace of oil or gas. Closed 15 minutes for shut in pressure. IBHFP 0#, FBHFP 320#, BHSIP 2905#, Hydro 3260#.

DST #8: MISSION CANYON - 11-26-51: 5939-5960' Used Halliburton test tool, 5/8" bottom choke, 1/4" top choke, no water cushion. Tool open at 8:44 A.M., received fair blow, flowed mud to surface 9:15 (31 minutes).

DST #8: (Continued)
Changed top choke to 1" at 10:15 A.M. Flowed sulphur water to surface 10:35 A.M. (1 hour and 15 minutes), closed in for top pressure 10:44 to 10:59 A.M. (15 minutes). Tool closed 10:59 A.M. to 11:19 A.M. (20 minutes) for bottom hole pressure. TFP on 1/4" choke 165#, TFP on 1" choke 35#, TSIP 425#. IBHFP 2035#, FBHFP 2850#, BHSIP 3059#, Hydro 3210#.

DST #9: MISSION CANYON - 6077-6145' 5/8" bottom choke, 1/4" top choke, no water cushion. Tool open 3 hours, weak steady blow for 2 hours, very weak blow for 1 hour. Shear pin in circulating sub sheared while coming out of hole which would let fluid in or out of drill pipe, depending on relative heights of fluid in drill pipe and between drill pipe and casing. Recovery brought to surface was 90' of sulphur, salt water with slight rainbow which was below circulating sub; 1440' pipe dripped mud which was oil cut. Water 43,000 PPM. IBHFP 90#, FBHFP 670#, BHSIP 3125#, Hydro 3405#.

DST #10: NISKU- 7307-7336' Packer set at 7307'. 1/2" bottom choke, 1/4" top choke, no water cushion. Test tool open 42 minutes, closed 15 minutes. Tool opened with good blow, flowed mud and salt water to surface 34 minutes, very little gas. Chloride test 73,000 PPM, Salt test 121,000 PPM. Top flow pressure 1/4" choke 180#. IBHFP 1400#, FBHFP 3600#, BHSIP 3700#, Hydro 4100#.

DST #11: NISKU - 7345-7354' Packers set at 7345' and 7354' (straddle packers) T.D. 7394'. 3/8" bottom choke, 1/4" top choke, no water cushion. Tool open 30 minutes, closed 15 minutes. Opened with good blow, died to weak bubble after 25 minutes. Recovered 880' salt water, 30' rat hole mud, slightly gas cut. Chlorides 52,000 PPM, Salt 85,000 PPM. IBHFP 0#, FBHFP 320#, BHSIP 3615#, Hydro 3995#.

DST #12: 5830-5844' Packer failed. Misrun. - Halliburton

DST #13: 5834-5844' Packer failed. Misrun. - Halliburton

DST #14: "C-2" - 5814-5827' with Halliburton test tool. Packer set at 5759' in 7" casing, 5/8" bottom choke, 1/4" top choke, no water cushion. Opened tool February 29, 1952; 7:38 A.M., fair blow; 7:57, weak blow; 8:05, no blow; 8:10, reset tool; 8:17, weak blow; 8:34, no blow; 8:37, reset tool; 9:45, weak blow; 10:05, no blow; 10:15, reset tool; 10:55, weak blow; 10:57, reset tool; 11:28, reset tool; 3:55 P.M., pull test tool. Recovered 3367' fluid, 900' light mud, 2467' stiff mud with abundance of free oil, bottom 90' free oil. IBHFP 350#, FBHFP 1400#, BHSIP 2750#, Hydro 3000#.

DST #15: "C-2" - 5814-5827' with Halliburton test tool. Packer set at 5759' in 7" casing, 5/8" bottom choke, no top choke, no water cushion. Open tool 9:20 A.M., 3/1/52, fluid to surface in 23 hours. Flowed mud and oil at approximately 150 barrels per 24 hours for 22 hours. Reversed out and pulled tool 3/3/52. Chloride test of mud from top of test tool 4700 PPM. IBHFP 230#, FBHFP 2380#, Hydro 3205#.

DST #16: "C-2" - 5799-5827' Packer set at 5759', 1/2" bottom choke, no water cushion. Tool open at 6:32 P.M., 3/5/52. Fluid to surface at 9:15 P.M., oil to surface at 12:15 A.M. Had considerable plugging of tool during this interval making it necessary to open and close tool a number of times. Flowed on 1/4" choke at 150#, cut back to 1/8" choke and flowed at 600#, making clean oil with slugs mud, estimated total of 15% mud, estimated 300 barrels fluid per day, no water. Tubing shut in pressure 900#, appears to be making very little gas. Reversed out 12:00 noon, 3/6/52. IBHFP 1800#, FBHFP 3100#, BHSIP 3100#, Hydro 3250#.

DST #17: "B-1" and "B-2" 3/7/52 5648-5680' with Johnston test tool. Bottom packer set at 5689', top packer set at 5636', 1/2" bottom choke, no water cushion. Tool open at 7:57 A.M., 3/7/52 with good blow. Gas to surface 8:03 AM, fluid to surface in 36 minutes; surface flowing pressure on 1/4" choke 340#; surface flowing pressure on 1/8" choke 830#. 10 minutes surface shut in pressure 960#. Estimated 625 barrels oil per day on 1/4" choke, estimated 400 barrels oil per day on 1/8" choke. BS&W = 0.2% corrected gravity 40.6. Tool closed 1:00 P.M. to 2:00 P.M., 3/7/52. IBHFP 1100#, FBHFP 2975#, BHSIP 3200#, Hydro 3250#.

MUD PROGRAM SUMMARY

EAST POPLAR UNIT WELL NO. "1"

MUD PROGRAM SUMMARY

Gel and Baroid were used to run electric logs for best evaluation. It would be practically impossible to compile a mud summary due to loss circulation and blowouts.

Mud weight over 10.4 lbs/gallon would start losing mud. Less than 10.4 lbs/gallon would start flowing.

DRILLING BIT AND TOTCO RECORD
AND DIAMOND CORE BIT RECORD

DRILLING BIT RECORD

Bit No.	Make	Size	Type	Ser. No.	From	To
1	Hughes	9 7/8			0	1058
2	Reed	17 1/2	Reamer		0	1058
3	Hughes	8 3/4	OSC-3	37028	1058	2142
4	"	"	"	17937	2142	2367
5	"	"	OSC	66480	2367	2921
6	"	"	"	64101	2921	3225
7	"	"	OSC-1	65682	3225	3450
8	"	"	OSC	64022	3450	3556
9	"	"	"	64111	3556	3675
10	"	"	OSC-3	18106	3675	3834
11	"	"	OSC	45989	3834	3973
12	"	"	"	67050	3973	4042
13	"	"	OSC-2	68167	4042	4267
14	"	"	OSC-1	65675	4267	4376
15	"	"	OSC-a	68288	4376	4516
16	"	"	OSC	9221	4516	4714
17	"	"	"	64015	4714	4774
17	"	"	"	"	4775	4785
18	"	"	"	64016	4785	4865
19	Reed	"	2H	30442	4865	4955
20	Hughes	"	OSC-2	68289	4955	4973
21	Reed	"	2C-WW	51275	4973	5012
22	"	"	2	1811	5012	5132
23	Hughes	"	OSC-2	68291	5132	5174
24	Reed	"	2H	30455	5174	5185
25	"	"	2HS-1	30899	5185	5246
26	Hughes	"	OSC-2	68180	5246	5320
27	"	"	OWC	52305	5320	5466
28	"	"	"	52202	5466	5683
29	"	"	OSC	64021	5683	5695
30	Reed	"	2H	30510	5695	5753
31	Hughes	"	OWC	52301	5753	5810
32	"	6 1/4	W7R	81945		
33	"	6 1/8	OWS	58901		
34	"	"	W7R	61663	6145	6147
35	"	"	"	Rerun	6528	6530
36	Reed	"	2C	59012	7075	7073
36	"	"	"	Rerun	7394	7400
36	"	"	"	"	7657	7659
36	"	"	"	"	7717	7718
36	"	"	"	"	8162	8166
37	"	"	"	59021	8873	8875

DIAMOND CORE BIT RECORD

Bit Number	Make	Size	Ser. #	Core #	From	To
Core Bit #1	Christensen	6 1/8	S 577	1	2367	2375
	"	"	"	2	4775	4785
	"	"	"	3	5174	5184
	"	"	"	4	5184	5223
	"	"	"	5	5683	5693
	"	"	"	6	5695	5752
	"	"	"	7	5753	5800
	"	"	"	8	5810	5819
	"	"	"	9	5819	5829
	"	"	"	10	5829	5880
Core Bit #2	Christensen	"	S1079	11	5881	5899
Core Bit #3	"	"	T789	12	5899	5914
	"	"	"	13	5914	5926
Core Bit #2	"	"	S1079	14	5926	5936
	"	"	"	15	5936	5960
	"	"	"	16	5962	5995
Core Bit #4	"	"	U1700	17	5995	6009
	"	"	"	18	6009	6035
	"	"	"	19	6035	6090
Core Bit #5	"	"	V300	20	6090	6145
	"	"	"	21	6147	6203
Core Bit #3	"	"	T789	22	6203	6258
Core Bit #4	"	"	U1700	23	6258	6314
Core Bit #3	"	"	T789	24	6314	6372
Core Bit #5	"	"	W-2	25	6372	6430
	"	"	"	26	6430	6488
Core Bit #7	"	"	W-3	27	6488	6528
	"	"	"	28	6530	6588
Core Bit #8	"	"	W-638	29	6588	6646
	"	"	"	30	6646	6704
Core Bit #9	"	"	W-756	31	6704	6763
	"	"	"	32	6763	6821
Core Bit #10	"	"	W757	33	6821	6879
	"	"	"	34	6879	6937
Core Bit #14	"	"	X2791	71	8680	8686
	"	"	"	72	8686	8737
	"	"	"	73	8737	8795
	"	"	"	74	8795	8846
Core Bit #15	"	"	X2041	75	8846	8873
Core Bit #16	"	"	X2045	76	8875	8933
Core Bit #17	"	"	X2118	77	8933	8992
Core Bit #16	"	"	X2045	78	8992	9047
Core Bit #17	"	"	X2118	79	9047	9055
Core Bit #14	"	"	X2791	80	9055	9058
Core Bit #18	"	"	X2040	81	9058	9064
Core Bit #19	"	"	X2833	82	9064	9087

Diamond Core Bit Record Continued

Bit Number	Make	Size	Ser. #	Core #	From	To
Core Bit #18	Christensen	6 1/8	X2040	83	9088	9102
Core Bit #20	"	"	Y263	84	9102	9108
Core Bit #21	"	"	Y2611	85	9108	9112
Core Bit #22	"	"	Y327	86	9112	9120
Core Bit #20	"	"	Y236	87	9120	9121
Core Bit #23	"	"	Y326	88	9121	9127
Core Bit #24	"	"	W-1363	89	9127	9137
Core Bit #25	"	"	Y500	90	9137	9145
Core Bit #24	"	"	W-1363	91	9145	9153
Core Bit #26	"	"	X610	92	9153	9154
Core Bit #27	"	"	Y1010	93	9154	9163

T O T C O R E C O R D

Depth Out	Degrees Off
1210	1 3/4
1520	1/2
1955	3/4
2485	1
3223	3/4
4040	3/4
4712	1/2
5130	1/2
6530	3 1/4
7320	2 1/4

FUTURE POSSIBLE PRODUCING INTERVALS

EAST POPLAR UNIT WELL NO. "1"

FUTURE POSSIBLE PRODUCING INTERVALS

1. Name of formation or zone:

Greenhorn	Log depth: 2367-75	(Core No. 1)	Questionable
Amsden	4776-77	(Core No. 2)	" "
A-1, 2, 3, 4	5482-5536	( )	
B-3	5686-92	(Core No. 5)	
B-4	5719-25	(Core No. 6)	
C-1	5789-96	(Core No. 7)	

2. Discussion:

Greenhorn: Core description indicates show in greenhorn which has never been tested.

Amsden: The show described in Core #2 has been tested and gave up 30' gas and oil cut mud and 85' brackish water in 30 minute test. Because of low water recovery and short test this could be considered a possible pay.

A Zones: All four of these zones produce in wells that are structurally lower.

B-3 Zone: Here again structurally lower wells are producing considering core description, this zone should produce.

B-4 Zone: Very little is known of this zone to date but considering the core description and structural position relative to EPU #92, this zone should produce.

C-1 Zone: This zone is producing in EPU #55. In #1 well it is structurally higher and a show is described in the core.

SAMPLE DESCRIPTION

SAMPLE DESCRIPTIONS

50	90	Gravel with some brown, unconsolidated, fine to coarse grained sand.
90	250	No Samples
250	700	Gray shale, trace gravel.
700	750	Gray, slightly silty shale, slight trace gray, fine grained, tight, angular, glauconitic, sandstone.
753		Sample Top Judith River
750	770	Gray shale, some gray, fine grained, tight, angular, glauconitic, micaceous sandstone.
770	810	Gray shale, trace glauconitic, micaceous sandstone, trace gravel.
810	820	Very light gray, fine to medium grained, calcareous, glauconitic sandstone, some gray shale.
820	1020	Gray silty to sandy shale, trace to some, fine to medium grained, tight, glauconitic sandstone, trace gravel.
1020	1060	Depth Correction
1060	1070	Gray, silty shale, trace limy sandstone, slight trace white limestone.
1070	1080	No samples.
1080	1100	Gray silty shale, trace to some limy sandstone, trace gravel.
1100	1200	No samples.
1200	1300	Gray, slightly silty shale, trace white, dense, sandy limestone.
1300	1350	No samples.
1350	1480	Gray, silty shale and silty sandstone, trace white, dense limestone.
1480	1520	Gray, glauconitic, silty, fine grained sandstone, with trace limestone at base.
1520	1540	Gray, silty, shale to silty sandstone.
1540	1580	Gray, silty shale, trace white, dense limestone, some very light gray, fine grained, tight, glauconitic sandstone.
1580	1590	Gray, silty shale.
1590	1630	Gray shale, some white, dense, shalky limestone, trace gray, very fine grained sandstone.

1630 1650 Grayish-brown, dense limestone, some gray, very fine to fine grained, tight sandstone.

1650 1820 Gray shale, trace white, dense, chalky limestone.

1820 1830 Gray shale, trace white, dense, chalky limestone, trace chert.

1830 1850 Gray shale, some bright red iron stained shale, trace limestone.

1850 1860 Gray shale, some white, dense, chalky limestone.

1860 1910 Gray shale, trace white, dense, chalky limestone, trace gray, very fine grained, tight, silty sandstone, trace chert.

1910 1920 Gray shale, abundant chert.

1920 1950 Gray shale, some white and brown, dense limestone, some chert.

1950 2000 Gray shale, trace to some white, dense, chalky limestone, trace to some chert.

2005 Sample Top Niobrara

2000 2030 Dull brownish-gray, silty shale, trace light gray, glauconitic sandstone, trace limestone.

2030 2040 Gray shale, trace, white, dense, limestone.

2040 2070 Gray, silty to sandy shale, slight trace white, dense limestone.

2070 2150 Gray, silty to sandy shale, some gravel, slight trace, white, dense, limestone.

2155 Sample Top Carlisle

2150 2180 Gray, silty, sandy shale, trace very fine grained sandstone, trace pyrite.

2180 2200 Gray, silty to sandy shale, some very fine grained sandstone, trace gravel.

2200 2240 Gray, silty to sandy, micaceous shale, some gray, very fine grained sandstone, some gravel.

2240 2270 Gray, silty to sandy, micaceous shale.

2270 2300 Gray, silty to sandy, micaceous shale, trace white, dense limestone.

2300 2350 Gray, silty to sandy, micaceous shale.

2350 Sample Top Greenhorn

2350 2367 Brown, dense limestone, some fine crystalline limestone, some dark brownish-gray calcareous shale.

2367 2375 Core No. 1, cut 8' recovered 8'.

2375 2400 Speckled white on brown, dense, mealy limestone, trace gray shale.

2400 2410 Dark gray, calcareous shale, some dark brown, dense, argillaceous, limestone.

2410 2420 Dark gray, calcareous, slightly micaceous shale.

2420 2440 Dark gray, calcareous, slightly micaceous shale, trace dark brown argillaceous limestone.

2440 2450 Dark gray, calcareous, slightly micaceous shale, trace very fine grained, argillaceous sandstone.

2450 2500 Very dark gray, micaceous shale, streaks white bentonite.

2500 2540 Very dark gray, micaceous shale, trace brown limestone, trace bentonite.

2542 Sample Top Graneros

2540 2570 Very dark gray, micaceous shale.

2570 2820 Very dark gray, micaceous shale, trace sandy shale, slight trace sandstone, slightly pyritic.

2820 2830 Speck green on brown, fine grained, tight sandstone and gray micaceous shale.

2830 2900 Dark gray, micaceous shale, some sandy shale, some fine grained, tight sandstone.

2900 Sample Top Muddy Sandstone

2900 2920 Very light gray, very fine grained, angular, porous sandstone.

2920 2940 Very light gray, very fine to fine grained, angular, very slightly porous sandstone and dark gray shale.

2946 Sample Top Skull Creek

2940 3010 Dark gray micaceous shale, trace silty sandstone.

3010 3045 Gray shale, trace gray silt.

3045 3050 Redish brown shale and sandy silt.

3050 3055 Gray shale, some redish-brown shale and very fine grained, tight sandstone.

3055 3060 Gray shale, trace gray siltstone.

3060 3065 Gray shale, trace gray siltstone, trace redish-brown, very fine grained, silty sandstone.

3065 3070 Redish-brown shale and very fine grained, tight sandstone, some gray splintery shale.

3070	3095	Gray-brown, very fine grained, hard and tight sandstone, some gray splintery shale.
3095	3100	Gray splintery shale, some gray, very fine grained sandstone.
3100	3105	Brownish red, very fine grained, tight silty sandstone and black, carbonaceous shale.
3105	3110	Gray, slightly micaceous shale.
3112		Sample Top Dakota Siltstone
3110	3130	Gray splintery shale and light gray, very fine grained, tight, sandstone and silt.
3130	3145	Gray, silty, micaceous shale.
3145	3175	Very light gray, silt and very fine grained sandstone, some gray shale.
3175	3215	White, very fine grained, porous sandstone, some gray splintery shale.
3215	3225	Red to redish-brown, fine grained, slightly porous sandstone, trace brown shale, some gray shale.
3225	3240	Gray splintery shale, some white, fine to medium grained, slightly porous sandstone.
3240	3275	White, fine grained, porous, micaceous sandstone, some gray splintery shale.
3275	3315	Gray to dark gray shale and white fine to medium grained, slightly porous sandstone.
3315	3320	Dark gray splintery shale, slight trace sandstone.
3320	3325	Dark gray splintery shale, trace red shale, slight trace sandstone.
3325	3385	Dark gray splintery shale, slight trace sandstone.
3385	3390	Dark gray to black, micaceous, fissile, shale, trace to some red, fine to coarse grained, tight, porous, sandstone.
3390	3400	Dark gray to black, micaceous, fissile, shale.
3400	3440	Dark gray to black, micaceous, fissile shale, trace to some, medium to coarse grained, porous sandstone.
3440	3450	Dark gray to black, fissile, micaceous shale, slight trace, white dense limestone.
3450	3550	Dark gray to black, fissile, micaceous shale, some white, fine to medium grained, porous, angular, micaceous sandstone.

3567		Sample Top Swift
3550	3615	Very light gray to tan, slightly calcareous, glauconitic, fine grained sandstone and gray splintery, micaceous shale.
3615	3630	Gray to brown, silt and silty sandstone and gray shale.
3630	3635	Gray micaceous splintery to fissile, shale, some brown crystalline limestone.
3635	3655	Gray, smooth, slightly micaceous shale, some tan, very fine grained, tight, micaceous, glauconitic, calcareous sandstone.
3655	3670	Very light tan, fine grained, sub-angular, porous, slightly calcareous, glauconitic sandstone and gray shale.
3670	3680	Gray, smooth, slightly micaceous shale.
3680	3715	Very dark gray, smooth shale, trace white, very fine grained, glauconitic sandstone.
3715	3720	White to light tan, very fine to fine grained, slightly porous, glauconitic sandstone.
3720	3750	Dark gray, smooth, slightly micaceous shale, slight trace white, glauconitic sandstone.
3750	3900	Dark gray, smooth, slightly micaceous shale, streaks light brown micaceous shale, occasional streaks brown siltstone and silty sandstone.
3897		Sample Top Vanguard
3900	3950	White to light tan, very fine grained, tight to porous calcareous, glauconitic sandstone and dark gray smooth shale, trace brown shale.
3950	4005	Gray-greenish and brown shale, trace to some white calcareous sandstone and siltstone.
4005	4060	Gray to greenish gray waxy, splintery shale.
4060	4080	Gray to greenish gray waxy, splintery shale, slight trace silty sandstone.
4075		Sample Top Rierdon
4080	4090	Gray to greenish gray, waxy, splintery shale, slight trace tan, very fine grained succhro limestone.
4090	4110	Greenish gray waxy shale, trace brown, very fine grained, succhro, tight limestone and limey sandstone.
4110	4140	Greenish gray, waxy shale, trace gray to tan, silty, calcareous sandstone.

Sample Descriptions Continued

4140	4245	Greenish gray, waxy shale, occasional thin streaks tight, silty sandstone.
4245		Sample Top Piper Shale
4245	4280	Greenish gray, waxy shale, trace to some red silt and shale, few pieces white gypsum.
4280	4335	Greenish gray, waxy shale, trace silt and silty sandstone.
4330		Sample Top Piper Limestone
4335	4380	Tan to brown, hard, dense limestone.
4387		Sample Top Gypsum Springs
4380	4475	Greenish gray, splintery shale, trace red shale, trace white anhydrite, occasional very thin streaks limestone.
4475	4535	Tan to gray, microcrystalline, dense limestone and greenish gray shale, trace to some red shale, occasional streaks white anhydrite.
4535	4580	Greenish gray, splintery shale, some red shale, some white anhydrite.
4578		Sample Top Spearfish
4580	4700	Greenish gray shale, some red siltstone, very fine grained sandstone, some red shale.
4700		Sample Top Amsden
4700	4715	Gray splintery shale, trace red shale, slight trace pink dolomite.
4715	4745	Pink to purple, crystalline dolomite, some greenish gray shale, some purple dolomitic shale.
4745	4755	Greenish gray shale, some purple dolomitic shale, trace tan, dense, limestone.
4755	4776	Tan, dense, fossiliferous limestone, some purple and greenish gray shale.
4776	4786	Core No. 2, cut 10', recovered 8'.
4786	4795	Purple dolomitic shale and greenish gray shale, some tan, dense limestone.
4795	4810	Tan, dense, microcrystalline limestone, some greenish gray and purple shale.
4832		Sample Top Heath
4810	4830	Purple dolomitic shale, some greenish gray shale, trace limestone.

4830	4850	Tan, dense, amorphous, very fossiliferous limestone, some purple dolomitic shale.
4850	4870	Redish brown to purple dolomitic shale, trace tan, dense limestone.
4870	4900	Greenish gray, purple, and redish brown shale, trace ankerites.
4900	4915	Redish brown shale, some purple and light gray variegated dolomitic shale, trace white sandstone.
4915	4925	Redish brown shale, some purple and light gray variegated dolomitic shale, trace ankerites, tred red, fine grained, tight sandstone.
4925	4995	Redish brown, purple, light gray, variegated shale, trace to some white to pink sandstone, trace ankerites.
4994		Sample Top Otter
4995	5060	Brick red shale and purple dolomitic shale, trace to some very light gray, dense, amorphous to microcrystalline limestone, trace ankerites. Some greenish gray shale.
5060	5080	Brick red shale, some purple and gray variegated dolomitic shale, slight trace white anhydrite, some greenish gray shale.
5080	5090	No samples.
5090	5130	Brick red shale, trace purple dolomitic shale, trace green and black shale, occasional trace white anhydrite.
5130		Sample Top Kibbey Sandstone
5130	5150	Brick red shale, some greenish gray and green shale, some light red, very fine grained, tight sandstone.
5150	5155	Purple dolomitic shale, some brick red shale, trace dense limestone, some white, tight sandstone.
5155	5165	Greenish gray, splintery shale, trace fine grained porous sandstone with some oil stain.
5165	5173	Greenish gray shale, some brick red and purple shale, trace red sandstone with some oil stain.
5173	5183	Core No. 3, cut 10' recovered 10'.
5183	5184	Drilled one foot.
5184	5223	Core No. 4, cut 39', recovered 39'.
5223	5270	Light red, fine to coarse grained, porous, poorly assorted sub-rounded, slightly calcareous, slightly selenitic sandstone.
5270	5280	Red, calcareous, silty to very fine grained sandstone, trace very light gray limestone.

5287 Sample Top Kibbey Limestone

5280 5290 Very light gray, dense, amorphous limestone, trace white anhydrite.

5290 5295 White anhydrite, trace limestone, trace red, silty to very fine grained, sandstone.

5295 5300 White to light gray, very fine grained, tight, calcareous sandstone, trace limestone, trace anhydrite.

5300 5330 Light gray, very fine to fine grained, some red, purple and yellow, shale, trace greenish gray shale.

5330 5350 Red, very fine grained, tight sandstone, some red and purple shale trace greenish gray shale.

5350 5375 Purple and dark red shale, trace to some red and brown, very fine grained, tight sandstone, trace to some greenish gray shale.

5375 5390 Light red silt and very fine grained sandstone, trace purple and red shale, some greenish gray shale.

5390 5410 Light red, silty to very fine grained, tight, calcareous sandstone, trace to some red shale, some greenish gray shale, trace white anhydrite.

5395 Sample Top Madison

5410 5430 Some white anhydrite, some red and purple shale, some greenish gray shale, some red to tan sandstone.

5430 5460 White, anhydrite, some greenish gray and redish brown shale.

5460 5465 Gray, very fine crystalline, tight, limestone, some dark red and gray shale.

5465 5480 White anhydrite, trace to some brown, dense limestone, trace red shale.

5482 Sample Top A-1 Zone

5480 5510 White to tan, oolitic, amorphous tight limestone, some anhydrite, trace red shale.

5510 5520 White anhydrite, some fine crystalline limestone, trace gray shale.

5520 5525 No samples.

5525 5560 Very dark brown, dense, amorphous limestone, trace to some white anhydrite, trace red shale.

5560 5580 No samples.

5580 5590 White anhydrite, some dark brown, dense limestone, some dark red and gray shale.

5590 5600 Very dark brown to tan, dense, limestone, trace to some white anhydrite, trace to some dark red and gray shale.

5600 5615 White anhydrite, some light gray dolomite, some dark brown, dense, limestone.

5615 5625 White anhydrite, trace dark red and gray shale.

5625 5640 White anhydrite, trace limestone, some greenish gray, very dark red shale.

5640 5645 Dark gray-greenish gray shale, some white anhydrite.

5649 Sample Top B-1 Zone

5645 5655 Some tan, silty limestone, some white anhydrite, some red and gray shale.

5655 5665 White anhydrite, trace to some brown, dense limestone, trace to some dark red and gray shale.

5666 Sample Top B-2 Zone

5665 5680 Dark brown, dense, amorphous limestone, trace white anhydrite.

Cored continuously from 5682 to 9163 except for few short intervals which were drilled.

CORE DESCRIPTION

CORE DESCRIPTIONS

Core No. 1 Greenhorn 2367 - 2375, recovered 8'
C.T. - 23, 20, 12, 12, 11, 14, 22, 32

8'0" Limestone: speckled white on brown and brownish gray, mealy to finely crystalline, hard and tight, becoming shaley in numerous irregular very thin streaks, numerous thin prismatic layers calcite throughout, $\frac{1}{4}$" to $\frac{1}{2}$" thick vertical calcite vein running length of core, very fossiliferous (Inoc.), bright golden fluorescence about 1' from base of core in shale streak, probable mineral fluorescence, core yielded small (2%) methane reading throughout.

Core No. 2 Amsden 4776 - 4786, recovered 8'
C.T. - 10, 9, 16, 45, 12, 18, 12, 12, 12, 12

1'0" Limestone: tan, micro-crystalline, dense, with fairly numerous anhydrite crystal masses and individual crystals scattered throughout, fair amount very small vugular porosity; highly fractured vertically, few streaks and spots bright golden fluorescence on fracture planes, few spots questionable brown oil stain, no odor, no taste, slight C Cl_4 cut.

2" Limestone: tan, massive, dense, hard and tight, numerous very thin light purple very calcareous shale streaks, slight sulphur odor on fresh break, no show.

10" Limestone: tan, locally light purple, massive to micro-crystalline, dense, crystals of anhydrite scattered throughout, few thin streaks light purple calcareous shale, few black stylolitic partings, hard and tight, slight sulphur odor on fresh break, no show.

1'0" Limestone: tan, micro-crystalline, dense, numerous anhydrite crystals and crystal massed, hard and tight, highly fractured vertically, slight sulphur odor on fresh break, numerous ostracod molds filled with calcite, no show.

10" Limestone: tan-brown, becoming purple and argillaceous in streaks, massive to micro-crystalline, dense, anhydrite crystals scattered throughout, occasional black stylolitic partings, hard and tight, few ostracod molds filled with crystalline anhydrite, slight sulphur odor on fresh break, no show.

4'2" Limestone: light tan, micro-crystalline, dense, moderate amount irregular crystalline masses and individual crystals anhydrite scattered throughout, very crude oolitic structure present in few areas, hard and tight, ostracod

molds filled with crystals anhydrite scattered throughout becoming very numerous toward base, single vertical fracture running length of unit, slight sulphur odor on fresh break, no show.

Core No. 3 Kibbey Sand 5174 - 5184, recovered 10'
C.T. - 7, 3, 5, 7, 6, 6, 6, 5, 6, 5,

2'3" Sand: brown, becoming light red in spots and streaks, fine to coarse grain, scattered green grains, sub-rounded, very porous and permeable, even light brown oil stain except in few red areas, good oil and gas tasted, even dull yellow fluorescence except in few red areas, good CCl_4 cut.
1'0" Sand: red with scattered green grains, fine to coarse grain, sub-rounded, poorly assorted, tight to slight porosity, no show.
1'0" Sand: red, scattered dark grains, medium to coarse grain, sub-rounded, poorly assorted, very well cemented, hard and tight, no show.
2'2" Sand: red, scattered dark grains, fine grain, sub-angular, micaceous, fairly well cemented, very slight porosity, no permeability, looks wet, no show.
2" Sand: light gray, fine grain, angular, fairly well cemented, few shale partings, tight, looks wet, no show.
2'0" Sand: same as above 2'2" except being very fine grain.
1'5" Sand: red, with scattered dark grains, very fine grain, becoming siltstone in streaks, fairly well cemented, micaceous, no show.

Core No. 4 Kibbey Sand 5184 - 5223, recovered 39'
C.T. - 23, 10, 7, 5, 5, 9, 3, 4, 5, 6, 4, 4, 6, 6, 6, 8, 8, 10, 6, 4, 5, 7, 5, 5, 7, 7, 7, 11, 8, 7, 7, 7, 6, 8, 12, 12, 6, 6, 17, 17

1'0" Shale: red, slight variegated with gray, slightly silty.
9" Sand: red, fine to coarse grained, poorly sorted, slight porosity and permeability, slightly calcareous and micaceous, looks wet, no show.
3" Sand: light purple, fine grain, tight, no show.
6'6" Sand: red, fine to coarse grained with scattered green grains, poorly sorted, porosity and permeability, calcareous, no show.
9" Sand: red, scattered green grains fine to coarse grained, very hard and tight, well cemented, calcareous, no show.
1'9" Sand: bright red, scattered green grains, fine to coarse grained, slight porosity and permeability, poorly cemented, slightly calcareous, no show.
3'0" Sand: light red, coarse grained, with few medium grains sand, hard and tight, appears to be cemented with selenite, no show.
1'2" Shale: bright red, silty, micaceous.
3'0" Silt to very fine grained sand, hard and tight, no show.

1'0" Sand: light red, medium to coarse grained, poorly cemented, hard and tight, appears well cemented with selenite, no show.
5'0" Sand: red, medium grained, becoming fine grained toward base, tight to questionably very slight porosity and permeability, some selenite cementing, no show.
3'0" Sand: red, very fine grained, silty, very hard and tight, trace of selenite cementing, no show.
10" Shale: red, with some gray variegating.
2'9" Sand: red, with some varicolored grains, fine to coarse grained, poorly sorted, very slightly calcareous, well cemented with selenite, very hard and tight, no show.
2'9" Silt: red, hard and tight, no show.
2'3" Shale: red.
3'3" Sand: red, some varicolored grains, medium to coarse grained, poorly sorted, slightly porous and permeable, selenite cemented with slight sulphur odor, no show. Vertical fracture from 5212'6"-17'0".

Core No. 5 "B-3" 5682 - 5692, recovered 10'
C.T. - 12, 3, 4, 4, 12, 9, 11, 14, 8, 10

6'0" Dolomitic Limestone: brown micro-crystalline, tight to questionably slightly porous and permeable, numerous very thin tight fracture planes having oil stain and bright golden fluorescence. Few prominent vertical fractures having crystalline anhydrite filling with some brown oil stain and bright golden fluorescence. Good oil odor, poor oil taste. Mass of core hard and tight with no apparent saturation. 1 black stylolite noted.
2'1" Dolomite: dark gray to dark brown. Amorphus hard and tight, no show.
1'11" Dolomitic Sand: light gray, fine to medium grained, sub-angular to sub-rounded, hard and tight, no show.

Side Wall Cores

5536 - 5554 micro-log showed good permeability
Sidewall core at 5552' - Limestone: very dark brown, hard, dense, micro-crystalline, greasy luster, fair oil odor, spotted light gold fluorescence.

5649 - 5657 micro-log showed good permeability
Sidewall core at 5654' - "B-1" - Limestone: tan-brown, firm, micro-crystalline, questionable slightly porous and permeable, even greasy luster, good oil odor, even dull golden fluorescence.
Sidewall core at 5655' - "B-1" - Limestone: dark brown, firm, hard, micro-crystalline, dense, trace greasy luster, no odor, few spots bright golden fluorescence.
Sidewall core at 4946' - Heath - Limestone: dark brown, hard, dense, micro-crystalline, no show.

5667 - 5680 micro-log showed good permeability

	Por.	Perm.	Oil	Water
5683	16.3	.53	2.7	97.3
5684	17.7	.1	8.8	91.2
5685	17.6	.26	0	0
5686	10.1	0	0	0
5687	14.4	0	3.1	88.1
5688	15.3	.1	0	85
5689	1.37	0	38	72
5690	0	0	0	0
5691	5.5	0	0	81.4
5692	4.1	0	0	75.9

Core No. 6 5695 - 5752

C.T. - 26, 26, 25, 24, 25, 21, 24, 19, 19, 25, 20, 15, 16, 16, 13, 10, 12, 13, 22, 5, 6, 8, 15, 9, 16, 12, 20, 13, 18, 16, 16, 15, 8, 14, 17, 17, 15, 14, 14, 12, 11, 17, 17, 14, 29, 24, 21, 23, 19, 14, 24, 19, 19, 22, 24

8'0" Dolomite: dark gray, massive, dense with scattered white massive anhydrite inclusions.

6'0" Anhydrite: white to light brown to light gray, massive, dense.

6'0" "B-4" - Limestone: very dark brown, finely crystalline with numerous crystals anhydrite scattered throughout, some fair even greasy luster with fair oil odor and bright spotted golden fluorescence

2'6" Dolomite: gray, massive dense, earthy texture.

1'0" Same as above with anhydrite inclusions.

2'6" Dolomite: dark gray massive, dense.

3'6" Anhydrite: light brown, micro-crystalline, dense with numerous thin streaks brown shale.

1'0" Dolomite: very dark gray, massive to micro-crystalline.

4'0" Alternating dark gray dolomite and white anhydrite, massive to micro-crystalline, dense.

4'0" Anhydrite: white to light brown, massive to micro-crystalline, dense, with few streaks and spots dark gray dolomite.

6" Dolomite: dark brown, massive, dense.

1'6" Alternating dark gray dolomite, anhydrite, massive to micro-crystalline, dense.

3'6" Dolomite: dark brown, massive, dense, fairly numerous inclusions white anhydrite.

5'0" Dolomite: dark brown, massive, dense.

2'0" Dolomite: dark brown, massive, dense, with few numerous veins light brown, finely crystalline anhydrite.

2'6" Limestone: brown, finely crystalline, hard and tight.

Core No. 7 5753 - 5800, recovered 47'

C.T. - 18, 21, 20, 17, 19, 18, 13, 19, 19, 13, 15, 20, 18, 18, 13, 18, 15, 16, 13, 17, 23, 14, 19, 15, 24, 17, 14, 15, 15, 21, 24, 17, 14, 18, 13, 15, 17, 15, 21, 18, 19, 17, 14, 10, 13, 12, 10

2'6"	"B-5" - Limestone: dark brown, dense, micro-crystalline, very thin streaks brown anhydrite toward base, no show.
3'6"	"B-5" - Limestone and Anhydrite: dark brown, micro-crystalline, massive anhydrite, white to light gray amorphous, no show.
1'6"	Limestone: dark gray to brown, dense, micro-crystalline, with few very small brown pellets scattered throughout.
1'6"	Same as above 3'6".
1'0"	Limestone: dark gray to brown, micro-crystalline, dense, no show.
1'0"	Same as above 3'6".
1'6"	Limestone: dark gray to brown, micro-crystalline, dense, no show.
3'0"	Limestone: dark gray to dark brown, very finely crystalline, dense, numerous dense streaks and inclusions white to brown anhydrite.
1'0"	Limestone: dark gray to dark brown micro-crystalline, dense, no show.
1'0"	Dolomite: gray micro-crystalline, dense, no show.
1'6"	Limestone: dark brown, very finely crystalline, dense, no show.
1'8"	Dolomite: dark gray, micro-crystalline, dense, no show.
1'6"	Anhydrite: gray to brown amorphous, dense, becoming dolomitic in streaks.
5'4"	Dolomite: dark gray, micro-crystalline, dense with occasional streaks brown dense limestone and gray to brown anhydrite, no show.
3'6"	"C-1" - Limestone: dark gray to dark brown, massive, becoming very finely crystalline in streaks, dense, no show.
3'6"	"C-1" - Limestone: dark gray to dark brown, finely crystalline to micro, dense, slight sulphur odor with numerous dark brown crystals anhydrite scattered throughout, no show.
2'0"	Dolomite: dark gray, dense, micro, no show.
1'0"	Limestone: dark brown, massive to micro-crystalline, few streaks dark gray anhydrite, dense, no show.
3'0"	Dolomite: very dark gray, massive, dense, with few thin pyritic zones, limy in thin streaks, no show.
6"	Shale: black fissile.
1'2"	Dolomite: dark gray to black, massive, dense, becoming argillaceous in streaks, no show.
3'10"	Dolomite and Limestone: dark brown, micro, dense, fairly numerous vertical fractures, oil stain on fracture planes. Good oil odor, fair taste, fairly numerous light bright golden fluorescence.
1'0"	"C-2" - Limestone: brown, micro-crystalline, dense with vertical fracture running through unit. Oil stain on fracture plane, good oil odor, fair taste, bright golden fluorescence on fracture planes.

Core No. 8 5810 - 5818, recovered 8'

8'0"	Limestone: dark gray to black, very fine to finely crystalline, very hard questionably slightly porous, no permeability, good oil odor, spotted stain and fluorescence

on fresh break. Entire core fractured throughout with free oil in fracture planes, even stain and bright gold fluorescence on fracture planes, slightly fossiliferous.

Core No. 9 5822 - 5830, recovered 8' ±
C.T. - 34, 32, 34, 38, 110, 145, 160, 230

8'0" Limestone: very dark brownish-gray to black, very finely crystalline, dense, very hard, large (¼" to ½") brown calcite crystals scattered throughout, few black stylolitic partings, core extremely fractured throughout, with gypsum and dolomite crystals covering most of fracture planes, scattered spots brown oil stain, fair to good oil odor, no taste, spots of bright light golden fluorescence all stain on fracture planes, no show in mass of core.

Core No. 10 5830 - 5880, recovered 49'

1'0" Fine brown to black, finely crystalline to dense limestone, fractured throughout. Gypsum and dolomite crystals on fracture plane, some stain, slight odor, light golden fluorescence.

12'0" Limestone: brown to black, finely crystalline to dense, numerous amounts brown calcite inclusions, slight incipient fracturing, sulphur odor on fresh break.

1'0" Limestone: brown to black, very fine crystalline with numerous calcite filled vertical worm boring, slight incipient fracture.

11'6" Limestone: brown to black, micro-crystalline to very finely crystalline dense calcitic, fair amount incipient fractures, stylolitic partings, slight oil odor, spotted fluorescence, fossiliferous.

1'6" Shale: black, calcareous with few pyritic brach, casts.

8'0" Limestone: very dark gray to black micro-crystalline, dense, fractured throughout, shaley in streaks, slight oil odor, spotted fluorescence on fracture planes.

10'0" Limestone: very dark brown to gray, finely crystalline to dense calcitic with few incipient fractures, stylolitic partings, sulphur odor, fossiliferous, no show.

4'0" Limestone: brown to black, finely crystalline to dense, very calcitic, highly fractured throughout, sulphur odor, no show.

Core No. 11 5881 - 5899½, recovered 18'6"
C.T. - 26, 17, 20, 16, 18, 14, 16, 18, 17, 23, 18, 16, 16, 17, 21, 18, 12, 37, 44

4'6" Limestone: very dark brownish black, very finely crystalline, with scattered coarse crystals calcite, few round masses brown calcite believed to be replaced oolites, very fossiliferous, dense, fractured vertically, pronounced horizontal fractures due possibly to gilsonitic partings, no show.

1'0" Limestone: very dark brownish-black, very finely crystalline, numerous medium to very coarse inclusions and poorly formed crystals brown calcite, dense, horizontal fractures, fossiliferous, no show.

4'0" Limestone: very dark brownish-black, very finely crystalline to crypto-crystalline, few brown coarse calcite crystalline, few round masses brown calcite, nodular, vertical fracture throughout unit, fracture planes covered with white calcite crystals, few globules brown oil noted, fair heavy oil odor, spotted to even light golden fluorescence all show on fracture planes.

3'6" Limestone: very dark brownish-black, very finely crystalline, numerous small inclusions and very coarse crystals brown calcite scattered throughout, very few short vertical fractures, no show.

1'0" Limestone: very dark brownish-black, medium oolitic, with very fine crystalline cement matrix, oolites poorly formed and mostly replaced by brown calcite, dense to questionably very slight porosity and permeability, fair oil odor, slight salt taste, slight greasy lustre, few bubbling pinpoints water, uneven light golden fluorescence, fossiliferous.

3'0" Limestone: very dark brownish-black, very finely crystalline, numerous small rounded masses and coarse crystals brown calcite scattered throughout, dense, fossiliferous, no show.

1'6" Limestone: same as above 3' but being very highly fractured and broken with white calcite on fracture planes, slight greasy lustre, no odor, spotted light golden fluorescence, all show on fracture planes.

Core No. 12 5900 - 5915, recovered 15'
C.T. - 13, 12, 11, 25, 17, 16, 14, 17, 15, 15, 16, 14, 30, 45

11'0" Limestone: very dark brownish-black, micro-crystalline to finely crystalline, numerous phenocrysts brown calcite, numerous irregular rounded masses brown calcite, slight sulphur odor on fresh break, slight incipient fracture, fossiliferous, no show.

2'6" Limestone: light brown, medium to coarsely crystalline, dense to very slightly porous and permeable, slight psudo oolitic appearance. Looks wet, sulphur odor, slight fracture, no show.

Core No. 13 5915 - 5926, recovered 10½'

1'6" Limestone: very dark brownish-black, very finely crystalline with numerous phenocrysts and rounded masses brown calcite, psudo colitic appearance, single vertical fracture, fossiliferous, no show.

2'0" Limestone: very dark brownish-black, finely to coarsely crystalline, numerous phenocrysts and rounded masses brown calcite, psudo oolitic, dense, fossiliferous, no show.

3'6" Limestone: very dark brownish-black, finely crystalline, numerous phenocrysts and irregular masses brown calcite, slightly psudo oolitic, highly fractured, calcite on fracture planes, fair oil odor, no taste, fairly even bright yellow fluorescence, fossiliferous, all show on fracture planes

3'6" Limestone: same as above 3'6" except fluorescence is very weak, dull and spotted, odor faint, questionable wet look.

Core No. 14 5926 - 5936, recovered 10'
C.T. - 17, 20, 25, 25, 26, 33, 24, 30, 60, 59

6'0" Limestone: very dark brownish-black, very fine to finely crystalline, numerous phenocrysts irregular brown masses brown calcite, dense, fractured throughout, light oil odor, pinpoint yellow fluorescence on fracture planes, sulphur odor on fresh break, 2" streak in middle unit having numerous small irregular cylinders white calcite, fossiliferous.

2'0" Limestone: very dark brownish-black, very fine to finely crystalline with occasional thin streaks medium crystalline, dense, numerous phenocrysts and irregular rounded masses brown calcite, strong sulphur odor on break, slight fossiliferous, no show.

2'0" Limestone: light brown, medium to coarse crystalline, dense, slight pseudo oolitic appearance, numerous very thin black shale stringers, strong sulphur odor on break, no show.

Core No. 15 5936 - 5960, recovered 24'
C.T. - 25, 25, 25, 17, 23, 19, 21, 32, 19, 33, 42, 21, 19, 13, 14, 14, 16, 15, 13, 14, 14, 16, 17, 11

3'0" Limestone: very dark brownish-black, very fine to finely crystalline, scattered phenocrysts and irregular rounded masses brown calcarous, no show.

5'0" Limestone: very dark brownish-black, micro-crystalline with streak coarse crystalline dense, single fracture through middle, fracture plane covered with coarse calcite crystalline, medium porosity, fair oil odor and taste, slightly brown oil stain, bright spotted light golden fluorescence, slight sulphur odor on break, fossiliferous, all show on fracture plane.
(Note: lost 1 pit (400 bbls.) mud on first 9'
lost 1 pit (400 bbls.) mud on next 3'

6'0" Limestone: very dark brownish black, very finely crystalline, numerous streaks and inclusions, coarse crystalline dense, fracture, strong sulphur odor on break, fossiliferous, no show.

3'6" Limestone: as above 6' except no fracture.

1'6" Limestone: very dark brownish-black, very finely crystalline, scattered phenocrysts and irregular rounded masses brown calcite, dense, single vertical fracture with calcite crystalline on fracture plane, brown, oil

stain, fair oil odor and taste, bright, light golden fluorescence, all show on fracture.

5'0" Limestone: dark brownish-black, finely crystalline, numerous phenocrysts and irregular rounded masses brown calcite, dense, fracture, no show.

Core No. 16 5962 - 5995, recovered 30'
C.T. - 9, 13, 10, 21, 13, 15, 13, 22, 15, 16, 18, 14, 11, 17, 17, 16, 14, 24, 21, 15, 18, 23, 20, 21, 23, 66, 60, 60, 67, 38, 43, 67, 18

4'6" Limestone: dark brown, finely crystalline to crypto crystalline, dense, numerous streaks black micro-crystalline, dense, argillaceous limestone, 1' slightly incipient fracture 2½' from top unit, slight oil odor, light pin point yellow fluorescence, all show on fracture plane, very fossiliferous.

7'4" Limestone: very dark brownish-black, very finely crystalline, dense, fossiliferous, no show.

3'6" Limestone: brown, medium crystalline to coarsely crypto crystalline, dense, single vertical fracture throughout unit. Fracture covered with small white calcite crystals, fair oil odor and taste; spotted light brown stain, spotted light golden fluorescence, fracture appears to have ± 1/32" separation, fossiliferous.

5'6" Limestone: very dark brown, micro-crystalline, dense, fossiliferous, no show.

1'2" Limestone: very dark brownish-black, massive, dense, argillaceous, no show.

8'0" Limestone: dark brown, massive to micro-crystalline, becoming coarsely crypto-crystalline in bottom 1', dense, trace incipient fracture, very fossiliferous, no show.

Core No. 17 5995 - 6009, recovered 14'
C.T. - 11, 13, 15, 14, 6, 8, 8, 8, 10, 7, 9, 7, 7, 29

14'0" Limestone: dark brown, very fine to coarsely crystalline occasionally crypto-crystalline, dense, few scattered stylolitic particles, extremely fractured 5998-99, 6003-06, 6008-09, strong sulphur odor on fresh break, fossiliferous, no show.

Core No. 18 6009 - 6034, recovered 25'
C.T. - 32, 18, 19, 11, 19, 13, 8, 6, 10, 13, 8, 12, 20, 23, 20, 16, 20, 20, 20, 20, 28, 14, 17, 18, 27

6'0" Limestone: dark brown, fine to coarsely crystalline with phenocrysts and irregular rounded massive brown calcite, dense, fractured from 6009-12, 6014-15, calcite crystals on fracture planes, sulphur odor on fresh break, fossiliferous, (spirifer), no show.

2'0" Limestone: dark brown, coarsely crystalline, very slightly porous, slightly permeable with very dark brown silt matrix which appears to be oil stain, slight sulphur oil odor, very weak spotted yellow fluorescence.

1'0" Limestone: brown, medium to coarsely crystalline, dense, with few large inclusions dark gray chert, sulphur odor, no show.

1'0" Limestone: as above 2' unit.

15'0" Limestone: very dark brown, micro-crystalline to finely crystalline, dense, some milky quartz noted at 6027', core fractured from 6024-34, fossiliferous, no show.

Core No. 19 6034 - 6090, recovered 56'

13'0" Limestone: very dark brownish-black, micro to finely crystalline; occasional dense streaks medium to coarse crystalline, dense, sulphur odor on fresh break, slight amount fracture, very slightly pyritic, fossiliferous, no show.

3'6" Limestone: brown, coarse, crypto-crystalline, very hard, dense, trace fracturing, strong sulphur odor on fresh break, fossiliferous, no show.

1'0" Limestone: brown, coarse crypto-crystalline, very hard, dense, slight incipient fracturing, light brown oil stain, good sulphur oil odor and taste; fairly even light golden fluorescence, all show on fracture plane.

15'0" Limestone: very dark brown, micro to finely crystalline, few dense streaks medium crystalline, dense, very hard, few dense streaks having inclusions of brown to blue-gray chert, trace incipient fracture with slight oil show in few incipient fracture.

8'0" Limestone: brown to very dark brown, very fine to finely crystalline, occasional coarse crypto-crystalline, very hard, dense, occasional streaks having numerous chert inclusions, few incipient fractures having light brown stain, fair odor, spotted yellow fluorescence, few black stylolitic partings, fossiliferous, no show.

4'0" Limestone: brown speckled very light brown, micro-crystalline, earthy, with numerous coarse crystals scattered throughout, becoming very coarse crystalline limestone in few streaks, very slightly porous, ? permeability; trace incipient fractures, fair to poor oil odor, brown stain; pin points yellow fluorescence. Show is in mass of core.

1'6" Limestone: buff, coarse crystalline, dense, trace light brown oil stain, fair oil odor, pin point yellow fluorescence, all show in bottom 6" of unit, fossiliferous.

9'0" Limestone: dark brown, very finely crystalline, earthy, with numerous coarse crystals scattered throughout, very slightly porous and permeable, appears to have dead oil stain, fair to poor oil odor, very few scattered weak pin-points yellow fluorescence, very fossiliferous.

Core No. 20 6090 - 6145, recovered 55'

1'6"	Limestone: brown, coarse crystalline, very slightly porous, questionable very slightly permeabile, spot light brown oil stain, good sulfur oil odor and taste, spotted light golden fluorescence, fossiliferous.
4'0"	Limestone: brown-gray, very finely crystalline, few streaks and inclusions coarse crystalline, very hard and dense, fossiliferous, no show.
6'0"	Limestone: brown, coarse to very coarsely crystalline with dark brown earthy very finely crystalline cementing material which appears to be oil stained, good sour oil odor, poor taste, pin point silvery blue fluorescence, fossiliferous, (looks like sharks tooth - crinoid stems).
0'4"	Chert, gray, massive.
1'0"	Limestone as above 6'.
1'0"	Limestone: light brown, medium crystalline, very hard, dense, trace light brown saturation,
0'2"	Chert, gray, massive.
2'0"	Limestone: as above 6'
1'6"	Limestone: brown, micro-crystalline, very hard, dense, few veinlets white calcite, trace styolitic partings, no show.
0'2"	Chert, gray, massive.
1'0"	Limestone, very dark brown, very finely crystalline, very hard, dense, few gray chert inclusions, good oil odor, no taste, greasy luster, spotted even yellow fluorescence, trace incipient fracture.
2'0"	Limestone: brown, micro crystalline, numerous coarse crystals scattered throughout, very slight porosity, questionable permeability, greasy luster, good sulfur oil odor, poor taste, pin point yellow-blue flucrescence.
1'6"	Same as 1' unit 1st above.
0'6"	Limestone: brown, alternately fine and coarse, crystalline, hard and dense, trace chert, no show.
0'6"	Limestone: as above 6'.
1'0"	Limestone: as above 1'.
1'0"	Limestone: as above 6'
1'0"	Limestone: brown, alternately fine and coarse crystalline, hard and dense, trace chert, no show.
1'0"	Limestone: as above 6'.
2'0"	Limestone: brown, micro crystalline, very hard and dense, numerous inclusions gray chert, styolitic partings, fossiliferous, no show.
0'6"	Limestone: as above 6'.
13'3"	Limestone: very dark brown, micro crystalline, very hard and dense, fair oil odor on fresh break, very slight oil taste, questionable oil stain, no fluorescence in mass of core, good yellow fluorescence in few large spots around side of core, Numerous small inclusions gray chert.
1'0"	Limestone, very dark brown, finely crystalline, scattered coarse crystals, very hard and dense, inclusions gray chert no show.
1'6"	Limestone: brown-black, coarse crystalline, very hard and dense, sulfur odor on fresh break, fossiliferous, no show.

6'0" Limestone: very dark brown, micro to finely crystalline, very hard and dense, chert inclusions, fossiliferous, no show.

4'6" Limestone: very light gray, massive to finely crystalline, very hard and dense with numerous carbonaceous bryozoan in bottom 1', no show.

Core No. 21 6147 - 6203, recovered 56'

4'0" Limestone: buff, massive to micro-crystalline, very hard and dense, fractured, good oil odor, no apparent stain, spot golden fluorescence, numerous thin carbonaceous streaks numerous carbonaceous bryozoan in upper 2'.

4'0" Limestone: micro to finely crystalline, brownish gray, very slight porosity, questionable permeability, no stain, taste, or fluorescence, carbonaceous, fossiliferous.

5'0" Limestone: very dark brownish gray, finely crystalline, occasional coarse crystalline with dark brown earthy cementing material, very slight porosity and permeability, fair oil odor, questionable very weak fluorescence, very slightly fractured in upper 2' of unit with few spots yellow fluorescence on fracture plane, very fossiliferous.

15'0" Limestone: light to dark gray, coarse crystalline with finely crystalline cementing material becoming micro to finely crystalline in thin streaks, very slightly porosity questionable permeability, fair oil odor on fresh break, spotted mineral fluorescence, abundant bryozoan and replaced crinoid stems.

5'6" Limestone: brown, gray, coarse crystalline, carbonaceous cementing material, very slight porosity, questionable permeability, fair to good sour oil odor on fresh break, very weak spotted blue fluorescnece, fossiliferous.

1'6" Limestone: buff, coarse crystalline, hard and dense, slight oil on fresh break, otherwise no show.

2'6" Limestone: light brown, coarse crystalline, very hard and dense, single vertical fracture, slight oil odor on fresh break, otherwise no show.

18'6" Limestone: brown, coarse crystalline, with very dark brown earthy inter-crystalline material, porous, slight permeability, extremely broken unit believed to have been reduced to small fragments while coring, no evidence of fracturing, fair to good sour oil odor, weak spotted yellow blue fluorescence, bottom 1' of unit intact.

Core No. 22 6203 - 6258', Recovered 55'

C.T. - 11, 6, 7, 7, 5, 5, 18, 18, 12, 14, 7, 9, 10, 15, 10, 17, 21, 17, 11, 12, 11, 9, 10, 26, 23, 30, 32, 20, 20, 20, 22, 23, 24, 51, 45, 42, 21, 12, 28, 26, 13, 28, 19, 25, 22, 29, 34, 31, 29, 28, 25, 25, 27, 24, 21

4'0" Limestone: medium, coarsely crystalline, dark brown, hard, dense, with a soft earthy dark brown intercrystalline material having questionable oil stain, fair oil odor on fresh break, faint oil taste, few weak spots dull yellow fluorescence, numerous replaced crinoid stems.

1'0" Limestone: beown-gray, fine, medium crystalline, very slight porosity, questionable permeability with very dark brown

soft earthy intercrystalline material with questionable dead oil stain, faint oil taste, faint oil odor on fresh break, no fluorescence, fossiliferous.

10'0" Limestone, dark brown, very finely crystalline, with few scattered coarse crystals, very hard and dense except for a 1' interval fracture 6215-16 which is slightly porous questionably permeable, fractured with trace saturation on fracture plane, bulk of unit has slight oil odor, otherwise no show, fossiliferous.

5'0" Limestone: brown, very finely crystalline, fairly numerous scattered coarse crystals, brown calcite, very slight trace incipient fracture faint oil odor on fresh break, otherwise no show, fossiliferous.

3'6" Limestone: very dark brown, finely crystalline, very slight porosity, questionable permeability, fair to good oil odor on fresh break, very faint oil taste, questionable stain, no fluorescence, fossiliferous,

31'6" Limestone: dark brown, micro crystalline to very finely crystalline becoming slightly coarse crystalline bottom 5' very hard and dense, very slight trace incipient fracture, very faint sulphur odor on fresh break, very fossiliferous (plant and animal), no show.

Core No. 23 6258-6314, recovered 56'

C.T. - 25,21,12,25,16,23,23,24,20,22,18,39,32,44,36,
26,33,40,48,37,28,20,19,22,35,17,26,22,22,20,
20,29,21,15,22,14,19,29,16,19,23,23,32,26,15,
20,28,37,67,35,29,26,40,26,36,19.

2'0" Limestone, dark brown-black, crypto crystalline, massive, hard, dense, scattered coarse crystals, large masses white to light buff calcite (coraline material?), numerous poorly perserved brachipods, fragments, no stain, no fluorescence, slightly salty taste, poor sour odor on fresh break.

16'0" Limestone: dark brown-black, crypto-crystalline, massive, hard, dense, no show, no fluorescence, slight salty taste, poor sour odor, scattered brachipods, fragments, few scattered gray chert pellets, few scattered fractures completely filled with white coarsely crystalline calcite, some yellow fluorescence on fracture plane.

1'6" Limestone: dark brown-black, finely crystalline to very finely crystalline, hard, dense, no stain, fair to poor sulphur oil odor, spotted pale yellow fluorescence in mass of core, may have slight porosity and permeability salty taste.

3'6" Limestone: dark brown-black, crypto-crystalline, massive, hard, dense, slight incipient fracture, pale yellow fluorescence on fracture plane, fair sulphur odor on fresh break, salty taste, no stain, scattered masses white crystalline calcite.

5'0" Limestone: brown-black, very fine to micro crystalline, hard, dense, scattered large pelecypod fragments, very slight sulphur odor on fresh break, salty taste, no fluorescence, no stain.

2'0" Limestone, brown-black, crypto crystalline, massive, hard, dense, very slight sulphur odor on fresh break, no stain,

salty taste, no fluorescence, scattered brachipod fragments.

2'0" Limestone: brown-black, crypto-crystalline to micro crystalline, massive, hard, dense, slight incipient fracture, slight sulphur odor on fresh break, salty taste, spotted yellow fluorescence on fracture plane, no stain, scattered styolitic partings, scattered brachipod fragments.

3'0" Limestone: brown-gray, finely crystalline to micro-crystalline, massive, hard, dense, vertical fracturing, slight sulphur odor on fresh break, salty taste, spotted yellow fluorescence on fracture plane, no show.

2'0" Limestone: brown-black, crypto-crystalline, massive, hard, dense, slight sulphur odor on fresh break, salty taste, no fluorescence, no stain, fossiliferous.

8'0" Limestone: brown-buff to white, fine to medium crystalline hard, dense, slight sulphur-oil odor on fresh break, salt-taste, no stain, no fluorescence, slight porosity, questionable permeability, numerous poorly preserved brachipods, styolitic.

4'0" Limestone, brown-buff, micro-crystalline, hard, dense, slight sulphur odor on fresh break, no stain, salty taste, trace incipient fracture throughout unit, spotted yellow fluorescence, on fracture plane, very fossiliferous, styolitic.

2'0" Limestone: gray-black, micro to crypto-crystalline, hard, dense, slight sulphur odor on fresh break, salty taste, no stain, no fluorescence, styolitic, fossiliferous.

4'0" Limestone: brown-black, finely crystalline to micro-crystalline, slight sulphur odor on fresh break, no stain, salty taste, no fluorescence, very fossiliferous, styolitic.

Core No. 24 6314-6372, recovered 58'
C.T. - 36,24,10,34,38,22,13,25,25,62,23,20,20,24,26,
15,15,52,40,43,60,29,26,30,30,30,45,25,45,25,
33,38,34,25,43,47,32,30,32,24,45,53,55,54,41,
41,16,18,64,30,31,27,28,35,35,38,36,46.

8'0" Limestone: gray-brown, very fine to micro crystalline, large embedded clacite crystals throughout, gray mottled chert nodules (1/8" to 1/2" diameter) numerous calcite replaced crinoid stem, scattered brachipod fragments, few hairline fractures, very hard and dense, slight sulphur odor on fresh break, slight salty taste, pale yellow spotted fluorescence, mostly along fracture, no visible stain.

11'0" Limestone: gray, fine to medium crystalline, becoming occasionally coarse-crystalline, vertical hairline fracture, very hard and dense, very slight porosity, no apparent permeability, fair to good sulphur odor on fresh break, no fluorescence, no stain, salty taste, fossiliferous, styolitic.

3'0" Limestone: gray, fine to medium crystalline, occasional coarse crystalline with thin stringers interbedded gray mottled chert and scattered styolites, slight sulphur oil odor on fresh break, immediately under chert layers,

good blue golden fluorescence in these zones, no fluorescence otherwise, salty taste, trace questionable stain, no apparent porosity, fossiliferous.

3'0" Limestone: brown-black, massive with scattered calcite crystals, very hard and dense, scattered nodules, dark gray chert, single vertical fracture throughout unit, spotted fluorescence on fracture plane, mud has invaded fracture, slight sulphur odor on fresh break, very slight salty taste, no stain.

15'0" Limestone, fine to medium crystalline with scattered coarse crystals, massive hard, dense, scattered light gray mottled chert nodules, trace hairline fracture with pale yellow spotted fluorescence on fracture plane, slight sulphur odor on fresh break, slight salty taste, no stain, fossiliferous.

3'0" Limestone: dark gray-black, micro-crystalline, argillaceous, massive, very hard and dense, scattered black chert nodules, vertical fracture with trace spotted pale yellow fluorescence on fracture plane, slight sulphur odor on fresh break no stain, slight salty taste, numerous replaced crinoid stems.

12'0" Limestone: gray to gray-buff, fine to medium crystalline, very hard and dense, trace gray mottled chert, some hairline fractures with golden yellow fluorescence on fracture plane, fair to good sulphur oil odor on fresh break, very slight salty taste, questionable trace black dead oil stain, stylolitic, fossiliferous.

3'0" Limestone: dark brown-black, massive, very hard and dense, argillaceous, few tight hairline fractures with good yellow spotted fluorescence on fracture plane, good sulphur odor on fresh break, slight salty taste, no stain, scattered poorly preserved fossiliferous fragments.

Core No. 25 6372-6430, recovered 58'

C.T. - 34,13,13,14,12,9,17,15,11,10,12,10,10,14,24, 12,14,10,11,13,11,11,10,10,10,13,13,14,20,32, 35,18,18,17,20,15,15,29,26,11,12,11,10,11,7, 15,12,7,10,9,11,9,8,10,8,11,10,8.

58'0" Limestone: dark gray to brown-black, argillaceous, very fine to micro-crystalline, massive, hard and dense, abundant, poorly preserved crinoid stems and brachipods, fair to good sulphur odor on fresh break, very slight salty taste on fresh break, no taste, no fluorescence in mass of core, scattered vertical fracturing throughout core. with bright golden fluorescence, good spotted oil stain, weak oil odor at 6383-84'; pale golden fluorescence, no stain in tight fracture at 6386-87 and 6390-91; bright golden fluorescence, spotted stain and weak oil odor at 6391-92; pale golden fluorescence and slight stain on tite fracture at 6397-98; weak golden fluorescence on tight fracture at 6409-10; large spots brown oil stain, spotted bright golden fluorescence and weak oil odor on calcite

filled fracture 1/32" wide at 6415-16. Thumb sized vug at 6406' partly filled with coarse crystalline calcite, light oil stain, black tarry residue in vug, weak oil odor strong golden fluorescence.

Core No. 26 6430-6488, recovered 58'
C.T. - 45,25,25,25,20,19,20,19,18,15,23,22,14,19,21,
13,17,10,15,17,18,9,15,16,6,13,21,21,11,17,
23,8,13,13,18,17,14,15,16,15,15,17,13,18,15,
16,16,16,16,17,17,10,13,13,10,15,21,13.

58'0" Limestone: darty dark brownish-black, micro crystalline, argillaceous, massive, hard, dense, very brittle, numerous thin tite calcite filled hairline fractures, slight stain and dull golden fluorescence on fracture plane at 6441' and 6455', otherwise no show in core, very slight salty taste to no taste, weak to good sulphur odor, few scattered poorly preserved fossils, few styolites, (note: much of the bottom 40' of core was badly broken up when taken from core barrel, giving the effect of heavy fracturing, however, it appears likely that the broken core is mostly due to the extreme brittleness of the rock and that most of the breaking occurred from partial jamming in the core barrel. A great amount of the breaking occurs without respect to the hairline fracturing evident in the core).

Core No. 27 6488-6528, recovered 40'
C.T. - 30,26,26,18,25,26,29,21,31,20,27,20,30,32,29,
24,28,15,44,20,29,30,24,25,24,9,21,40,30,29,
27,21,19,18,15,18,22,18,18,23.

Core barrel jammed at 6528', cut approximately 3" in 50 minutes.

4'0" Limestone: dark brown-black, argillaceous, very fine to micro crystalline, hard, dense, massive few thin tight hairline clacite filled fractures, no fluorescence, no stain, weak sulphur odor on fresh break, no taste.
1'0" Shale: black, slightly calcareous, very slight sandy, very hard, tite, vertical hairline fracture, breaks with conchodial fracture, no fluorescence, no stain, no odor, no taste.
4'0" Limestone, as above.
1'0" Shale: black, slightly calcareous, good bedding plane cleavage, slight sulphur odor on fresh break, no show, no taste.
6'0" Limestone, dark brown-black, argillaceous, cryptocrystalline, massive, hard, dense, scattered thin calcite filled tite hairline fracture, no show.
1'6" Shale: black, calcareous, good bedding plane cleavage.
17'6" Limestone: brown to buff becoming dark brown at base, micro-crystalline, massive, hard, dense, few thin black, calcareous shale partings in upper part of unit, highly fractured at 6514, 6518, and 6528, fractured at 6528 caused core barrel

to jam, slight sulphur odor on fresh break, slight salty taste, no fluorescence, no stain, sparsely fossiliferous.

Core No. 28, 6530-6588, recovered 58'
C.T. - 30,41,30,33,24,37,24,26,13,24,26,23,25,25,26,
23,24,23,20,21,24,17,19,16,39,40,41,20,28,31,
35,29,31,31,24,36,23,35,17,35,18,28,33,20,30,
16,23,29,24,19,30,48,31,35,31,45,32,58.

29'0" Limestone: brownish-black, slight argillaceous, dense, massive, hard, slightly pyritic, no stain, no fluorescence, no show, no taste, very faint sulphur odor on fresh break, few scattered gastropod and brachipod fragments.

7'0" Limestone: dark brownish-black, very argillaceous, dense, massive with few thin streaks brown, finely crystalline limestone, no odor, no stain, no fluorescence, no taste, scattered pyrite crystals and pyritized fossils, fragments, scattered styolites.

Lodge Pole 6'0" Limestone: brownish-black, argillaceous, dense, massive, hard, scattered tight vertical hairline fracture, fairly abundant pyrite crystals, abundant brachipods and crinoid stems, few gastroped fragments, no stain, no odor, no fluorescence, no taste.

16'0" Limestone: dark brownish-black, argillaceous, dense, massive, hard, few tite vertical hairline fractures, calcite filled fractures 1/16" wide fracture 6576½ to 6579, very slight sulphur odor on fresh break, no stain, no fluorescence, no taste.

Core No. 29 6588-6646, recovered 58'
C.T. - 3,22,6,5,9,6,13,7,8,7,8,8,8,13,7,
8,8,6,5,8,4,9,5,7,8,9,8,8,5,9,
5,12,8,12,8,10,14,17,12,6,9,14,11,7,10,
14,9,5,11,20,8,11,13,6,21,5,11,8,

58'0" Limestone: dark brownish-black, slightly argillaceous becoming argillaceous toward base, slightly pyritic, massive, hard, dense, no stain, very slight sulphur top 10', no taste, trace weak dark golden fluorescence on calcite filled fracture 1/16" wide at 6593-95, otherwise no show, scattered tite vertical hairline fracturing throughout core, styolitic, scattered crinoid stems and brachipods.

Core No. 30, 6646-6704, recovered 58'
C.T. - 8,5,5,5,6,5,5,5,6,6,5,5,6,5,5,
5,7,6,5,4,5,5,6,7,6,6,8,8,8,7,
9,8,8,7,8,8,5,6,8,7,7,14,10,14,8,
8,11,7,13,13,10,10,9,10,7,7,10,6.

58'0" Limestone: very dark brownish-black, argillaceous, becoming very argillaceous in thin streaks, massive, medium hard, becoming very hard in middle of unit, dense scattered inclusions white crystalline anhydrite, sparsely fossiliferous, 1 vertical calcite filled fracture 2' long

6620-62, very few scattered very tight hairline fractures in middle of unit, very slight sulphur odor to no odor, no taste, no fluorescence, no stain.

Note: vertical fracture noted above seems to coincide with slight increase in high voltage gas readings on mud truck, no increase in low voltage.

Core No. 31 6704-6762, recovered 58'
C.T. - 11,12,10,12,15,12,11,11,8,9,9,7,10,9,8,
10,10,9,9,8,12,12,8,8,16,9,10,8,12,8,
10,11,13,9,9,8,14,10,11,10,20,23,10,10,13,
5,6,9,7,14,10,10,8,17,13,25,10,45.

58'0" Limestone: very dark brownish-black, argillaceous, medium hard, massive, dense, scattered inclusions white crystalline anhydrite, scattered crinoid and brachiped fragments very few very tite hairline vertical fractures, 2½' calcite filled fracture 1/10" wide from 6756-6758½', no taste, no stain, no fluorescence.

Core No. 32 6762-6821, recovered 59'
C.T. - 5,6,4,7,7,9,10,7,8,5,11,7,6,6,7,
6,4,10,8,7,6,7,8,15,10,12,11,12,8,9,
8,6,7,9,6,6,7,7,6,6,6,6,6,6,5,
7,5,5,5,7,5,5,5,6,6,5,6,6,6,

59'0" Limestone: very dark brownish-black, argillaceous, medium hard, becoming very hard in thin streaks massive, dense, few scattered inclusions white crystalline anhydrite top 5', scattered brachipod shells and crinoid stems, calcite filled vertical fractures from 6765-6768,6802-6805, 6805½-6808, very few very tite hairline fractures throughout remainder of core, no odor, no taste, no fluorescence, no stain.

Core No. 33 6821-6879, recovered 58'
C.T. - 7,6,9,5,9,6,5,6,8,7,7,6,9,8,5,
9,8,7,9,8,6,5,6,5,5,9,6,5,5,8,
6,5,9,5,7,6,10,7,7,5,11,8,7,7,10,
8,5,11,11,7,8,4,8,5,13,5,5,6

58'0" Limestone: very dark brownish-black, argillaceous, medium hard, becoming very hard in thin streaks, massive, dense, no open fractures in core, very few tite vertical hairline fractures, very few irregular inclusions, white, crystalline, anhydrite, very sparsely fossiliferous, no odor, no stain, no fluorescence, no taste.

Core No. 34 6879-6937, recovered 58'
C.T. - 4,5,4,6,6,4,5,6,5,5,5,5,5,4,5,
5,5,5,5,5,6,4,5,5,5,3,5,4,4,5,
4,3,3,3,4,5,3,3,4,4,4,4,7,10,6,
9,8,8,9,10,10,9,8,12,9,9,9,10

23'0" Limestone: brownish-black, micro crystalline, very hard and dense, massive, argillaceous, some tite vertical hairline fractures, few pyritized fossiliferous fragments, scattered brachipods and crinoid stems, very faint sulphur odor to no odor, no taste, no fluorescence, no stain.

31'0" Limestone: dark brownish-black, crypto-crystalline, very hrad and dense, massive, very brittle, most of unit badly crushed but shows tendency to break both vertically and horizontally, tite vertical hairline fracturing present where core is not crushed, few pyritized fossiliferous fractures, scattered crinoid stems, scattered large crystals calcite and calcite inclusions, no odor, no taste, no stain, no fluorescence.

4'0" Limestone: dark brownish-black, slightly argillaceous, hard and dense, massive, some tite vertical hairline fracturing, very few scattered fossils, no odor, no taste, no fluorescence, no stain.

Core No. 35 6937-6995, recovered 58'
C.T. - 8,7,11,7,10,7,7,8,15,9,9,7,6,15,15,
11,5,9,8,12,7,11,7,15,3,20,5,9,11,17,
7,10,3,10,14,10,8,12,3,15,6,10,23,15,8,
10,9,10,6,9,9,8,6,4,8,7,9,12.

17'6" Limestone: dark brownish-black, very hard and dense, stylolitic, massive, slightly argillaceous, becoming very argillaceous, in thin streaks, some tite hairline vertical fractures, slightly pyritic, sparsely fossiliferous, no stain, no odor to very faint sulphur odor on fresh break, no fluorescence, no taste.

20'6" Limestone: black, very hard and dense, groundmass with irregular masses and scattered crystals coarse crystalline, brown limestone, very crinoidal, small scattered inclusions gray chert, slightly pyritic, thin wavy streaks and lens black very argillaceous limestone throughout unit, no stain, no fluorescence, no odor, no taste.

20'0" Limestone: gray-brown, medium hard to hard, dense, massive scattered masses coarse crystalline brown limestone, crinoidal, slightly pyritic, scattered brachiped shells, entire unit broken by many thin wavy streaks black very argillaceous limestone from 1/16" to 1" thick, no stain, no fluorescence, no odor, no taste.

Core No. 36 6995-7035', recovered 40'
C.T. - 15,20,23,24,26,25,24,33,25,30,31,25,24,24,25,
31,20,30,19,22,23,25,25,28,20,21,21,18,19,18,
21,18,16,18,23,18,17,16,25,15.

Core barrel jamed at 7035' when connection was made.

11'0" Limestone: gray-black, medium hard, dense, crinoidal, with thin interbedded streaks and lens black very calcareous shale, no odor, no stain, no taste, no fluorescence.

7'0" Limestone: dark brownish gray black, hard, dense, slightly argillaceous, becoming black and very argillaceous in thin streaks, crinoidal, no dor, no stain, no taste, no fluorescence, no odor, no stain.

3'0" Limestone: gray-black, dense, hard, slightly argillaceous with thin streaks black calcareous shale, scattered crinoids and brachipods, no ddor, no taste, no fluorescence, no stain.

19'0" Limestone: dark brownish-black, medium hard to hard, dense, massive, argillaceous, few scattered brachipods and crinoid stems, slightly pyritic, few tite vertical hairline fractures, fracture in upper part of unit apparently caused barrel to jam, no odor, no taste, no fluorescence, no stain.

Core No. 37 7035-7075, recovered 39'
C.T. - 11,8,6,6,12,7,7,7,8,6,5,6,8,4,4,
3,4,7,6,6,6,6,7,5,15,14,9,12,12,10,
26,15,14,9,19,11,15,7,17,33,43,34,27,

39'0" Limestone: brownish-gray to very dark gray, massive to micro crystalline, dense, fairly hard, brittle, very slightly argillaceous, scattered minute white calcite inclusions, slight trace pyrite, vertical fracturing 7035-36 & 7069-70, fossiliferous, no show.

Core No. 38 7078-7136', recovered 55'
C.T. - 35,11,11,13,8,11,12,20,11,13,10,11,5,20,6,
7,16,8,5,9,12,14,5,14,7,12,7,13,11,10,
13,7,12,13,11,11,10,11,13,11,13,12,11,14,16,
22,16,17,11,10,10,10,10,12,10,10,10,8

27'0" Limestone: brownish-gray to very dark gray, massive to micro-crystalline, dense, fairly hard, very slightly argillaceous, becoming very argillaceous in streaks, trace incipient fracture, very slightly pyritic, very slightly fossiliferous, no show.

4'0" Limestone: dark gray, massive, dense, fairly hard, trace incipient fracture, no show.

16'0" Limestone: same as above 27' unit, except for a few thin streaks which have no argillaceous material.

5'0" Limestone: dark gray, massive, micro-crystalline, fairly hard, dense, slightly argillaceous, with few thin streaks becoming black, fractured, no show.

3'0" Limestone: black, massive, dense, hard, slightly argillaceous shaly cleavage, fossiliferous, no show.

Core No. 39 7136-7194', recovered 60'
C.T. - 18,51,18,23,31,19,16,25,32,28,30,22,20,27,20,
25,25,32,30,23,25,20,27,25,21,24,16,20,25,21,
18,20,20,15,16,23,20,12,17,15,19,17,16,23,19,
20,20,26,16,23,21,25,19,32,17,23,26,28.

	5'0"	Limestone: very argillaceous, to very calcareous shale, black, dense, massive, fairly hard, trace vertical fracture, good shale cleavage in streaks, no show.
	5'0"	Limestone: very dark brownish-gray, massive to micro-crystalline, fairly hard, dense, slightly argillaceous, trace fracturing, no show.
	8'0"	Limestone: very dark gray-black, massive, dense, hard, brittle, fractured in streaks, no show.
	4'6"	Limestone: very argillaceous, to shaly, very calcareous, black, dense, massive, fairly hard, trace vertical fracture good shale cleavage in streaks, becoming good calcareous shale in bottom of unit.
	8'6"	Limestone: dark gray, crypto-crystalline to finely crystalline, dense, fractured in upper 2', pyritic, fossiliferous, no show.
	4'6"	Shale: black, appears carbonaceous.
Bakken	24'0"	Dolomite, very dark brownish-gray, micro-crystalline to very finely crystalline, hard, dense with numerous shale partings, slightly calcareous, fractured from 7188-91, no show.
	0'6"	Shale: black, appears carbonaceous.

Core No. 40 7194-7252, recovered 58'
C. T. - 12,10,10,11,13,11,11,10,6,15,14,7,12,10,16,
10,26,13,16,17,15,16,18,14,10,8,8,9,8,8,
9,10,10,8,7,8,6,9,6,7,6,6,6,7,8,7,6,8,8,
6,5,13,9,7,7,9,9,7,

3 Forks	16'0"	Dolomite, gray, massive to micro-crystalline, dense, fairly hard, with few thin streaks and inclusions tan, finely crystalline dolomite, very pyritic, occasional fracturing, no show.
	8'0"	Dolomite: tan to gray, massive, dense, fairly hard, fractured in streaks, no show.
	3'6"	Dolomite, gray, massive, argillaceous, dense, numerous tan finely crystalline streaks and inclusions dolomite, no show.
	3'6"	Dolomite: tan, finely crystalline, dense, very hard, with numerous thin gray angular dolomite partings, no show.
	3'6"	Dolomite, gray, very finely crystalline, dense, very hard with numerous irregular very thin streaks argillaceous dolomite scattered throughout, no show.
	1'6"	Dolomite, tan, finely crystalline, dense, very hard, no show.
	9'6"	Dolomite, very numerous tan, finely crystalline, dense, irregular inclusions in a mass of gray massive dolomite, occasional fracturing, no show.
	3'6"	Dolomite, gray, micro-crystalline, dense, hard, no show, trace fracturing.
	10'0"	Dolomite, rusty red, argillaceous, massive to micro-crystalline dense, hard, few small inclusions green dolomite, no show, occasional fracturing.

Core No. 41 7252-7310, recovered 58'
C.T. - 8,12,15,3,3,6,6,7,6,7,8,6,7,7,8,8,7,6,

7252-7310

Core Description Continued

9,8,6,7,9,10,20,11,14,11,16,17,20,12,13,
11,13,9,17,11,17,8,9,12,9,9,14,14,12,11,
14,11,22,11,15,16,17,10,17,11

1'0" Dolomite, rusty red, micro-crystalline to massive, fairly hard, dense, very argillaceous, shale cleavage, no show, fractured.

2'0" Dolomite, buff, very finely crystalline, very hard and dense with numerous small inclusions very thin lenses green dolomite, shale, no show.

5'0" Dolomite, green, massive to micro-crystalline, hard and dense, soapy texture where massive, with numerous light pinkish red, very finely crystalline laminae dolomite scattered throughout, no show, slightly fractured.

8'6" Dolomite, rusty red, micro-crystalline to massive, hard and dense with few scattered inclusions green finely crystalline dolomite, no show, fractured.

0'6" Dolomite, rusty red, massive to micro crystalline, hard and dense, with numerous fairly large inclusions pink crypto-crystalline anhydrite, no show.

2'0" Dolomite, rusty red, micro-crystalline to massive, soapy texture where massive, hard and dense, few inclusions and laminae green dolomite, no show.

4'0" Dolomite, mottled, buff light red and green, becoming solid green at base, massive to micro-crystalline, hard and dense, no show, occasional fracture.

3'6" Dolomite, mottled pinkish buff and green, micro-crystalline, hard and dense with numerous fairly large inclusions pink crypto-crystalline anhydrite, no show.

5'0" Anhydrite, gray, translucent, crypto-crystalline to massive, dense, no show.

1'6" Dolomite, brown, finely crystalline, firm, slightly porosity, very slight permeability, very strong sulphur odor, calcareous, looks wet, no show.

3'0" Dolomite, medium to micro-crystalline, well developed, very slight porosity, no permeability, fairly hard, very calcareous in upper portion, sulphur odor on break, no show.

3'0" Anhydrite, gray, translucent, crypto-crystalline, dense, no show with few thin streaks brown crystalline dolomite near base.

1'0" Dolomitic limestone, brown, micro-crystalline, very slight porosity, no permeability, strong sulphur odor, looks wet, no taste, no fluorescence.

1'0" Dolomite, brownish-gray, very finely crystalline, very hard and dense, very slightly calcareous, fractured, no show.

11'0" Anhydrite, gray, brown and white, massive to crypto-crystalline, translucent, no show.

1'0" Dolomite, limestone, brown, very finely crystalline, hard and dense, no show.

2'6" Dolomite, brown, micro-crystalline to very finely crystalline, dense to very slight porosity, questionable permeability, becoming saturated where porosity in streaks, good sweet oil odor and taste, fairly even bright light golden fluorescence.

Nisku 2'6" Dolomite, calcareous, brown, medium crystalline, well developed crystals, pencil point porosity in top becoming slightly vuggy and honey-combed toward base, very good musty oil odor and taste, fairly even to spotted bright light golden fluorescence.

Core No. 42, 7310 - 7320, recovered 11'
C.T. - 13,8,7,8,10,10,4,9,7,10

2'6" Dolomite, brown, very fine to finely crystalline, very hard, slightly calcareous, fairly good vugular porosity and streaked to even intercrystalline porosity, slight permeability, vugs very small and irregular and lined with calcite crystals, good musty oil odor and taste, greasy lustre, fairly even bright yellow fluorescence.

3'0" Dolomite, brown, very fine to finely crystalline, very hard, dense, except for a few thin streaks having slight vugular and inter crystalline porosity, very slight permeability, numerous streaks and inclusions white calcite, occasional very slight incipient fracturing, good show where ever porosity as above 2'6".

2'0" Same as above 2'6".

3'6" Same as above 3' but having only two porosity streaks approximately 3" thick, one in muddle of unit and one at base.

Core No. 43, 7321 - 7336, recovered 15'
C. T. - 3,6,7,5,2,6,3,4,10,5,3,5,5,6,4,

3'9" Dolomite, brown, finely crystalline, crystals well formed, calcareous, fairly hard, fair, streaked, inter-crystalline and vugular porosity, incipient fracturing present, slight permeability, some vugs pencil size and lined with calcite crystals, good oil odor and taste, greasy lustre, fairly even bright yellow fluorescence. (show is in vugs, on incipient fracture planes and in mass of core)

4'0" Dolomite, brown, finely crystalline crystals well formed, calcareous, fairly hard, very slight even intercrystalline porosity, good vugular porosity in top becoming poor at base, numerous vugs filled with calcite but still retaining some porosity, slight incipient fracturing present, slight permeability, good oil odor and taste, greasy lustre, fairly even bright to dull yellow fluorescence.

2'6" Dolomite, brownish gray, micro-crystalline, crystals fairly hard, calcareous with very slight inter crystalline porosity, trace vugular porosity, questionable very slight permeability, in few thin streaks, slight incipient fracturing, which might carry permeability, scattered inclusions white calcite, fair oil odor, poor taste, greasy lustre, spot-streaked dull yellow fluorescence.

4'9" Dolomite, brownish gray, micro to finely crystalline, fairly hard, irregular streaks poor inter crystalline porosity, good vugular porosity (pencil sized), vugs lined with calcite crystals, questionable slight permeability, good oil odor and taste, greasy luster and brown stain where dis-

cornable, streaked bright yellow fluorescence.

Core No. 44, 7336 - 7395, recovered 58'
C. T. - 36,10,13,9,13,11,12,15,19,14,9,6,10,13,8,
9,8,11,11,8,7,8,8,15,14,14,14,10,15,12,
15,10,8,14,7,13,8,8,22,10,11,16,15,18,15,
9,20,11,17,12,16,12,18,15,13,11,21,14.

6'0" Dolomite, brownish gray, very fine to finely crystalline, streaked inter crystalline porosity and few very small vugs, very slightly fractured otherwise dense, questionably very slight permeability, slight calcareous, few calcite inclusions, good oil odor, good oil taste, trace free brown oil, spot-streaked bright yellow fluorescence.

4'0" Dolomite, brownish gray, finely crystalline, dense, very hard, very slightly calcareous, slight sulphur odor on break, no show.

7'0" Dolomite, brownish gray-brown, very fine to finely crystalline, very slight vugular with streaks inter-crystalline porosity, permeability in streaks, good oil odor and taste, brown oil stain, spot and streaked fluorescence with few streaks solid fluorescence.

5'0" Dolomite, brown fine to medium crystalline, hard and dense slight calcareous numerous coarse dark brown calcite crystals in upper portion, slight fractured, no show.

8'0" Dolomite, brownish-gray-brown, micro-crystalline to very crystalline, slightly calcareous, hard and dense, becoming argillaceous in few thin streaks, no show.

Duperow 4'0" Dolomite: gray buff, micro to very finely crystalline, hard, and dense, with numerous large white inclusions anhydrite, no show.

6'0" Dolomite, light brown, micro-medium crystalline, hard and dense, no show, slight trace fracturing.

1'6" Dolomite, very light gray, micro crystalline, hard and dense, very slightly calcareous, few small inclusions white anhydrite, no show.

5'6" Limestone: brown, massive-micro-crystalline, fairly hard, dense, very slightly fractured, numerous dark brown, very coarse crystals aragonite (?) scattered throughout, no show.

2'0" Dolomite, light brown-gray, very fine to finely crystalline, hard and dense, no show, slightly calcareous.

1'0" Limestone: light brown, very fine crystalline, hard and dense, no show.

8'0" Dolomite, calcareous to dolomitic limestone, brown, very fine to finely crystalline, hard and dense, occasional black styolitic partings, no show.

Core No. 45, 7400 - 7458, recovered 58'
C.T. - 12,17,9,12,11,9,13,8,10,9,10,11,9,12,10,
9,8,8,10,11,10,9,9,10,11,8,12,6,7,6,
10,8,11,12,6,12,15,9,8,8,7,8,8,8,10,
10,17,10,9,15,9,13,11,14,10,8,4,5

14'3" Limestone, light brownish gray, micro crystalline to massive,

dense, hard, slightly incipient fracturing, very fossiliferous, no show.

1'6" Dolomite, calcareous, brownish-gray, crypto-crystalline, hard and dense, no show.

2'3" Limestone, dolomite, dark brownish-gray, micro-crystalline to massive, hard and dense, aragonite, numerous thin irregular black shale laminae, no show.

4'0" Limestone, brownish gray, crypto-crystalline, massive, hard, and dense, no show.

1'6" Dolomite, very dark gray, micro-crystalline, very calcareous hard and dense, aragonite, very fossiliferous, no show.

4'6" Anhydrite, gray, crypto-crystalline, dense, no show.

1'0" Dolomite, very dark gray-black, micro-very finely crystalline, hard and dense, no show, few white anhydrite inclusions.

2'6" Dolomite, brown-brownish gray, very finely crystalline, hard and dense, few white crystalline anhydrite inclusions, no show.

5'0" Dolomite, very dark gray, massive, very hard and dense, no show.

3'6" Anhydrite, green-very dark green, crypto-crystalline to massive, fairly hard, dense, no show.

4'0" Dolomite, light brown, very finely crystalline, hard and dense, with numerous irregular streaks and inclusions and individual crypto-crystals anhydrite scattered throughout, no show.

1'0" Dolomite, gray, massive-micro-crystalline, hard and dense, no show.

3'6" Anhydrite, brownish gray to gray, very finely crystalline, hard and dense, no show.

4'0" Dolomite, gray, massive-micro-crystalline, very hard and dense, smooth textured, no show.

4'0" Anhydrite, brown-brownish gray, crypto crystalline, hard and dense, no show.

1'6" Dolomite, dark brown, finely crystalline, fairly hard, trace inter-crystalline porosity, questionably very slight permeability, strong sulphur odor on fresh break, no show.

Core No. 46, 7458 - 7516, recovered 58'
C.T. - 9,11,4,4,5,11,5,7,8,8,4,6,7,14,7,5,
4,10,15,15,10,10,15,10,10,10,6,8,8,8,8,
11,10,5,7,11,11,8,9,10,9,9,9,12,7,9,
7,5,5,7,6,5,6,5,5,8,5,7,

1'0" Limestone, dolomite, dark brownish-gray, massive with few scattered fine crystals, hard, dense to questionably very slightly porous, no show.

1'6" Dolomite, brown, finely crystalline, some inter-crystalline porosity, questionably very slight permeability, fairly hard, sulphur odor on fresh break, no show.

3'6" Limestone: dark brownish-gray, very hard and dense, micro-crystalline to massive, slightly dolomitic, no show.

4'6" Dolomite, brown, finely crystalline, hard, very slight porosi questionable permeability, becoming very anhydritic and very finely crystalline toward base, sulphur odor on fresh break, no show.

1'0" Dolomite, same as above 4'6" except being hard and dense,
6'6" Dolomite, gray to light gray, micro crystalline, massive, very hard and dense, no show.
4'0" Dolomite and anhydrite, interlaminated, brownish gray to gray, micro-crystalline, massive, hard and dense, no show.
2'0" Dolomite, dark brown, finely crystalline, hard and dense, no show.
5'0" Dolomite, dark brown, finely crystalline, fairly hard, trace streaked inter-crystalline and vesicular porosity, numerous inclusions and fairly thick (3") white acicular anhydrite, very slight oil odor where porosity, very faint bluish fluorescence, looks wet, slightly fractured in lower portion.
6'0" Dolomite, brownish-gray, finely crystalline, hard and dense, numerous white crystalline anhydrite inclusions scattered throughout, no show.
12'0" Dolomite, very dark gray, micro-crystalline, very hard and dense, trace incipient fracturing, few dark brownish-gray thin anhydrite streaks in lower 2'.
2'0" Anhydrite, gray-light gray, massive, fairly hard, dense, no show.
5'0" Dolomite, dark brown, finely crystalline, hard and dense, slightly fractured with white anhydrite crystals on fracture planes, no show.
2'0" Dolomite, light brown, micro to very finely crystalline, hard, dense, very slightly fractured, looks wet, no show.
1'6" Anhydrite, brownish-gray, massive, dense, no show.
2'0" Dolomite, brown, finely crystalline, hard and dense, numerous small inclusions white calcite, no show.

Core #47, 7516-7557, recovered 41'
C.T. - 7,4,10,4,6,4,4,5,5,11,6,8,8,8,9,
16,14,5,13,10,10,10,7,7,8,6,4,12,3,11,
4,4,5,6,11,4,4,7,7,3,12

14'0" Dolomite, brown, finely crystalline, fairly hard, fairly good inter crystalline porosity with some porosity, very slight permeability, permeability becoming dense in few thin streaks, few scattered white calcite inclusions, slight sulphur odor on fresh break, no show.
2'6" Dolomite, light gray, micro-crystalline, very hard and dense slight incipient fracturing, no show.
3'0" Anhydrite, gray, massive, hard and dense with thin streaks gray brown dolomite throughout, no show.
2'0" Dolomite, tan, micro crystalline, fairly hard, very slightly intercrystalline porosity, slight trace vugular porosity, ? very slight permeability, few inclusions white calcite, sulphur odor on fresh break, looks wet, no show.
19'6" Dolomite, dark brown, finely crystalline, fairly hard, streaked and uneven inter crystalline porosity, slight trace vugular porosity, becoming dense in spots and streaks, few white dolomite crystalline crystals, occasional incipient fracturing, strong sulphur odor on fresh break, no show.

Core No. 48, 7557 - 7599, recovered 42'
C.T. - 5,4,11,6,5,6,3,3,6,6,7,6,6,5,5,5,5,5,5,7,
4,4,4,5,3,6,6,18,6,10,7,7,7,8,6,6,7,6,7,8,
6,5,

4'0" Dolomite, micro-crystalline, very light gray-green, very hard and dense, very calcareous in top, pyritic, no show,
4'6" Gypsum, white to very light gray, soft, crystalline, dense, no show.
5'0" Anhydrite, brownish gray-green, massive-crypto-crystalline, dense, fairly hard, no show.
2'0" Limestone, gray to very dark brownish gray, massive to very finely crystalline in streaks, very hard and dense, trace incipient fracturing, no show.
8'0" Dolomite, brown, finely crystalline, hard, slightly porous with occasional irregular spots and streaks becoming dense, porosity is intercrystalline with trace some vugular porosity, very slightly permeability to permeability, calcite crystals, scattered throughout, very strong sulphur odor, no show,
2'6" Dolomite, gray, very fine to finely crystalline, hard and dense, no show.
3'6" Dolomite, same as above 8' except having no odor and becoming more dense.
3'0" Limestone: very dark brown, massive, hard and dense, occasional very dark brownish-black shale partings, no show.
9'6" Dolomite, brown, very fine to finely crystalline, very hard and dense, no show.

Core No. 49, 7599-7657, recovered 58'
C.T. - 11,9,10,8,7,10,7,4,5,6,5,8,9,5,11
8,8,10,5,5,7,6,4,5,5,4,7,5,5,10,
16,7,6,5,17,6,8,7,9,5,13,8,10,7,7,
7,6,10,8,7,10,7,7,6,10,8,5,9,

3'0" Dolomite, gray, very fine crystalline, very hard and dense, no show.
2'6" Anhydrite, brownish gray, massive, fairly hard, dense, no show.
7'0" Dolomite, brown, very fine crystalline, fairly hard, slightly inter-crystalline porosity, questionable very slight permeability, looks wet, no show.
14'6" Dolomite, brown, fine crystalline, dense to very slightly intercrystalline porosity in streaks, no permeability, few white calcite inclusions, looks wet, no show.
1'0" Dolomite, gray, micro-very fine crystalline, hard and dense, no show.
1'0" Anhydrite, brownish gray, massive, dense, fairly hard, no show.
1'0" Dolomite, gray, very fine crystalline, hard and dense, no show.
4'0" Anhydrite, brownish gray, massive, fairly hard, dense, with numerous laminae gray dolomite throughout, becoming very dolomitic at base, no show.
1'6" Dolomite, brown, micro-crystalline, hard, very slight intercrystalline porosity, numerous thin lenses and inclusions anhydrite, strong sulphur odor, no show.

3'0"	Anhydrite, dark brown, massive, fairly hard, dense, impure, no show, possibly limey.
1'0"	Dolomite, very dark gray to black, massive, dense, hard, few shale partings, no show.
3'0"	Anhydrite, brownish-gray, massive, dense, fairly hard, no show.
2'6"	Dolomite, light brown, massive-micro-crystalline, hard and dense, very anhydritic, no show.
2'0"	Dolomite, dark brown, very finely crystalline, hard and dense, no show.
9'0"	Anhydrite, light brownish, gray, massive, dense, fairly hard, no show.
0'6"	Dolomite, light brown, massive to micro-crystalline, slight inter-crystalline porosity, no permeability, very calcareous, looks wet, no show.
2'0"	Dolomite, light brownish-brown, micro-crystalline to massive in few streaks, hard and dense with few very thin streaks inter-crystalline porosity, questionable permeability, one vertical fracture in unit with calcite on fracture planes, porosity zones and fracture planes have good oil odor, fair oil taste, spotted golden fluorescence, no show in dense portion.
0'10"	Anhydrite, brownish-gray, massive, dense, fairly hard, no show.
0'6"	Dolomite, tan, micro-crystalline, massive, hard, trace of inter-crystalline porosity, looks wet, few veinlets white calcite, no show.
1'0"	Anhydrite, brownish-gray, massive, dense, hard, no show.
0'8"	Dolomite, tan, finely crystalline, very hard and dense, glassy lustre, no show.

Core No. 50 7659 - 7717', recovered 58'

C.T. - 10, 7, 10, 10, 10, 13, 5, 10, 9, 7, 7, 6, 8, 8, 10, 8, 10, 9, 8, 7, 5, 9, 4, 6, 6, 6, 8, 6, 5, 6, 9, 8, 6, 4, 6, 7, 4, 7, 10, 5, 8, 5, 9, 7, 5, 6, 14, 16, 6, 12, 10, 11, 22, 12, 15, 22, 10

2'0"	Dolomite, brown, micro-very fine crystalline, porosity in top becoming very slightly porous at base, fairly hard, questionable permeability, looks wet, no show.
9'6"	Dolomite, anhydritic, very dark gray, micro-crystalline, hard and dense, few thin streaks pure very finely crystalline dolomite, occasional very slightly argillaceous, no show.
1'6"	Anhydrite, brownish-gray, massive, hard and dense, no show.
2'6"	Anhydritic dolomite, very dark gray, micro-crystalline, very hard and dense, no show.
10'0"	Dolomite, brown, very fine to finely crystalline, hard and dense, except for occasional very slightly porous spots, slightly fractured, fair musty oil odor on fracture planes, spotted to streaked bright gold fluorescence, greasy lustre, general appearance of unit is wet. All show on fracture planes.

19'6"	Dolomite, brown, finely crystalline, dense to questionable very slight porosity, no permeability, occasionally fractured, fractures having greasy wet look, weak spot yellow blue fluorescence, musty oil odor, no show in mass of core.
1'0"	Dolomite, gray, micro-crystalline, very hard and dense, no show.
1'0"	Anhydrite, very light gray, firm dense, no show.
0'6"	Dolomite, dark brown, micro-crystalline, hard and dense, numerous large anhydrite crystals scattered throughout, no show.
1'0"	Dolomite, dark brown, finely crystalline, hard, very slightly porous, questionable permeability, looks wet, sulphur odor, no show.
2'6"	Anhydritic dolomite, light brown, finely crystalline, massive in top 6", hard and dense, no show.
5'0"	Dolomite, brown, finely crystalline, hard and dense, slightly calcitic, trace of fracturing, dead oil stain on fracture planes, musty oil odor, spotted light gold fluorescence, appears wet.
2'0"	Dolomite, dark brown, finely crystalline, slightly porous in top becoming very porous at base, questionable permeability, numerous fossiliferous molds partially filled with calcite having dead oil stain, musty oil odor, spotted light golden fluorescence, general wet look.

Core No. 51 7718 - 7776', recovered 58'
C.T. - 6, 5, 5, 7, 8, 5, 6, 7, 5, 4, 5, 6, 4, 4, 4, 8, 6, 3, 7, 7, 11, 6, 6, 7, 7, 9, 6, 6, 6, 7, 5, 4, 5, 4, 5, 6, 5, 6, 9, 4, 4, 4, 4, 5, 6, 5, 5, 5, 10, 17, 6, 13, 11, 16, 9, 14, 14, 20

13'0"	Dolomite, brown, finely crystalline, dense to very slightly porous in few irregular spots, (porosity inter-crystalline), very calcitic, trace incipient fracturing with dead oil show on fracture planes, musty oil odor, dark brown stain, spotted yellow fluorescence, no show in mass of core.
12'0"	Dolomite, very dark gray to brownish-gray, micro-crystalline to massive in few streaks, very hard and dense, brittle, calcareous in streaks, sulphur odor on fresh break, no show.
2'6"	Limestone, very dark gray to very dark brownish-gray, massive to micro-crystalline, very hard and dense, brittle, slightly dolomitic, no show.
1'6"	Dolomite, brown, micro-crystalline, hard and dense, slightly anhydritic, H_2S odor on fresh break, no show.
4'6"	Dolomite, dark brown, very fine to finely crystalline, dense, to very slightly porous, (porosity inter-crystalline), hard, strong H_2S odor on fresh break, no show.
20'0"	Dolomite, dark brown to very dark brownish-gray, micro-crystalline to very finely crystalline, dense with very slight trace inter-crystalline porosity, no permeability, few scattered anhydritic crystals, occasional black stylolitic and shale partings, sulphur (H_2S) odor on fresh break, no show.
4'0"	Dolomite, very dark gray, micro-crystalline, very hard and dense, brittle, trace fracturing with calcite covering fracture planes, no show.

Core No. 52 7776 - 7834', recovered 58'
C.T. - 10, 5, 4, 9, 8, 7, 8, 7, 7, 7, 6, 6, 5, 6, 6, 5, 6, 5, 11, 7, 6, 5, 8, 9, 6, 5, 15, 10, 8, 10, 8, 10, 8, 8, 4, 5, 8, 9, 9, 6, 7, 5, 6, 4, 8, 7, 9, 7, 7, 7, 10, 5, 7, 8, 5, 5, 5, 15, 15, 10

2'6" Dolomite, very dark gray, micro-crystalline, hard and brittle, dense with few very slightly porous spots, strong H_2S odor on fresh break, no show.
21'6" - Souris River - Dolomite, gray, very dark brownish-gray, micro-crystalline, hard and dense, slightly pyritic, occasional H_2S odor on fresh break, no show.
1'0" Anhydrite, gray, massive, dense, no show.
3'0" Limestone, very dark brown, massive micro-crystalline, very hard and dense, occasionally fractured, no show.
10'6" Limestone, dark brown, micro-crystalline, finely crystalline, occasional streaks massive, very hard and dense, occasional black shale partings, trace of fracturing, no show.
12'0" Dolomite, gray to very light tan, micro-crystalline, very hard and dense, no show.
6'6" Dolomite, very dark gray-brown, very fine to finely crystalline, hard and dense, slightly fractured with calcite on fracture planes, no show.

Core No. 53 7834 - 7891', recovered 57'
C.T. - 7, 10, 10, 10, 13, 12, 10, 10, 11, 12, 6, 21, 8, 11, 20, 13, 15, 10, 13, 13, 12, 17, 8, 14, 7, 10, 10, 8, 9, 9, 6, 6, 7, 3, 6, 6, 6, 7, 7, 7, 8, 10, 7, 5, 9, 10, 6, 8, 13, 12, 12, 8, 11, 10, 5, 1, 8

30'0" Dolomite, gray, very dark gray, micro to very finely crystalline, very hard, brittle, dense except for two 1' streaks very slight porosity at 7838' and 7840', few scattered thin white calcite veins, slightly anhydritic with few small anhydrite lenses toward base, no show.
3'0" Dolomite, brown, finely crystalline, hard, unevenly very slight porosity, no permeability, some incipient fracturing, H_2S odor on fresh break, no show.
17'0" Dolomite, very dark gray, micro-crystalline, very hard and dense, brittle, with very thin streaks and inclusions anhydrite scattered throughout, no show.
1'0" Dolomite, light brown-tan, very finely crystalline, hard, questionable very slight porosity, no permeability, scattered anhydrite crystals, looks wet, no show.
6'0" Dolomite, very dark gray, micro-crystalline to very finely crystalline, hard and dense, brittle, trace of fracturing, no show.

Core No. 54 7891 - 7949', recovered 58'
C.T. - 4, 9, 7, 8, 8, 6, 12, 14, 10, 8, 9, 7, 6, 6, 7, 9, 8, 8, 5, 11, 9, 6, 16, 3, 6, 9, 10, 10, 7, 7, 7, 8, 8, 4, 8, 8, 8, 19, 8, 10, 11, 6, 6, 7, 8, 10, 4, 7, 8, 9, 8, 12, 8, 8, 6, 5, 9, 10

5'0" Dolomite, dark gray, micro-crystalline, very hard and dense, brittle, incipient fracturing, no show.

3'0" Anhydrite, dark brownish-gray, massive, dense, no show.

23'0" Dolomite, very dark gray to brownish-gray, micro to very finely crystalline, very hard and dense, brittle, very anhydritic in upper 7', occasional fracturing throughout with anhydrite crystals on fracture planes, occasional thin black shale partings with pyritic crystals, no show.

2'0" Dolomite, very dark brownish-gray, massive with scattered masses finely crystalline, very hard and dense, fractured, very calcareous, no show.

25'0" Dolomite, brownish-gray to very dark gray, micro-crystalline, very hard and dense, brittle, trace of fracturing and incipient fracturing, very few anhydritic streaks, scattered black anhydritic shale partings and thin streaks, no show.

Core No. 55 7949 - 8008', recovered 59'

C.T. - 3, 4, 9, 6, 10, 8, 6, 7, 9, 5, 5, 9, 4, 5, 10, 3, 7, 7, 6, 6, 6, 6, 4, 4, 8, 6, 12, 3, 3, 7, 5, 8, 10, 9, 6, 8, 9, 7, 8, 6, 7, 9, 8, 6, 5, 5, 7, 7, 8, 8, 9, 5, 5, 7, 6, 8, 7, 5

19'0" Dolomite, gray to very dark gray or black micro-crystalline, very hard and dense, brittle, becoming shaley in thin streaks, occasional incipient fracturing, no show.

2'0" Anhydrite, gray, massive, dense, no show.

10'0" Dolomite, dark gray, finely crystalline, very hard and dense, brittle, few vertical veinlets white anhydrite, no show.

9'0" Dolomite, gray to very dark gray or black, micro-crystalline to massive in thin streaks, very hard and dense, brittle, becoming argillaceous with shale cleavage in few streaks, no show.

11'0" Dolomite, very dark gray, micro-crystalline, very hard and dense, brittle, conchoidal fracture, very slightly anhydritic in top of unit, slight trace of fracturing, no show.

8'0" Dolomite, very light gray, micro-crystalline, very hard and dense, brittle, no show.

Core No. 56 8010 - 8068', recovered 56'

C.T. - 12, 14, 9, 5, 5, 7, 8, 7, 5, 6, 7, 4, 5, 7, 6, 4, 4, 5, 5, 5, 5, 6, 7, 5, 5, 5, 4, 5, 5, 4, 3, 5, 4, 6, 5, 8, 14, 7, 7, 6, 6, 4, 6, 6, 8, 7, 8, 12, 9, 10, 11, 22, 5, 5, 10, 8, 12, 11

11'0" Dolomite, light gray to dark brownish-gray, micro-crystalline, very hard and dense, brittle with fairly numerous incipient fractures situated at varying angles, a 1" black shale streak in middle of unit.

16'6" - Dawson Bay - Dolomite, dark brown, very finely crystalline, hard, slightly inter-crystalline porosity, no permeability becoming dense in few streaks, moderately fractured with some incipient fracturing, very few scattered small vugs partially filled with calcite crystals, strong H_2S odor on fresh break, looks wet, no show.

13'6" Dolomite, dark brown, very finely crystalline, hard, dense. to questionabley very slightly porous, no permeability,

occasionally fractured with some incipient fracturing, moderate amount small vugs scattered throughout, some vugs containing black asphaltic residue, some vugs filled with calcite, fairly numerous black stylolitic partings, spotted yellow-blue fluorescence believed min., faint H_2S odor on fresh break, no show.

10'0" Dolomite, same as above 13'6" but having numerous fairly large vugs, numerous fractures and incipient fractures, no show.

2'0" Dolomite, same as above 13'6", no show.

3'0" Dolomite, very dark brownish-gray, very finely crystalline, very hard and dense, fractured in lower 1', fracture planes covered with calcite crystals having bits of black asphaltic residue scattered among them, no show.

Core No. 57 8068 - 8126, recovered 58'

C.T. - 3, 3, 9, 9, 9, 7, 11, 6, 6, 9, 4, 6, 4, 8, 5, 4, 7, 4, 10, 8, 6, 8, 10, 8, 9, 9, 9, 9, 10, 9, 10, 9, 10, 10, 8, 9, 7, 7, 9, 14, 8, 11, 6, 7, 10, 8, 7, 6, 9, 7, 8, 8, 11, 6, 7, 12, 9, 10

12'0" Dolomite, very dark gray, micro to very finely crystalline, very hard and dense, numerous irregular very thin black shale partings throughout, no show.

4'0" Dolomite, light gray, micro-crystalline to massive, very hard and dense, brittle, very slightly pyritic, no show.

5'0" Dolomite, tan, massive, very hard and dense, brittle, pyritic, no show.

5'0" Dolomite, reddish-brown, micro-crystalline to massive, very hard and dense, brittle, pyritic, few very thin white crystalline anhydrite veinlets, no show.

2'6" Dolomite, very dark gray, micro-crystalline to massive, very hard and dense, brittle, few very thin white crystalline anhydrite veinlets, no show.

4'0" Dolomite, reddish-brown, micro-crystalline, very hard and dense, very slightly pyritic, no show.

1'0" Dolomite, mottled reddish-brown and gray, micro-crystalline, very hard and dense, no show.

5'0" Dolomite, gray to dark gray, micro-crystalline, very hard and dense, no show.

5'0" Dolomite, dark gray with tan and reddish-tan mottling, tan colors have shape suggesting detrital matrix, micro to very finely crystalline, very hard and dense, no show.

6'0" Dolomite, dark gray, micro to very finely crystalline, very hard and dense, very slightly anhydritic, no show.

2'6" Dolomite, dark brownish-gray, micro-crystalline, very hard and dense, no show.

6'0" Anhydrite, dark brownish-gray, massive, dense, fairly hard, dolomitic, several gray dolomitic streaks in top, numerous laminae very dark gray to black shale throughout, no show.

Core No. 58 8126 - 8162', recovered 36'

C.T. - 12, 5, 4, 6, 6, 7, 7, 5, 5, 6, 8, 4, 4, 8, 4, 8, 6, 7, 3, 5, 5, 7, 5, 5, 6, 7, 4, 10, 6, 7, 10, 10, 9, 9, 11, 11

4'6" Dolomite, dark brownish-gray, micro-crystalline, very hard and dense, brittle, no show.

6'6" Dolomite, dark brownish-gray, micro to very finely crystalline, very hard and dense, numerous irregular streaks and inclusions dark brownish-gray massive dolomitic anhydrite, no show.

25'0" Dolomite, gray to very dark gray or black, very hard and dense, very fine to finely crystalline, numerous black shale partings, becoming argillaceous in thin streaks and in bottom 5', scattered very small white crystalline anhydrite inclusions, occasional fracturing and incipient fracturing, extremely fractured in bottom 3', no show.

Core No. 59 8165 - 8220', recovered 54'
C.T. - 4, 7, 6, 8, 5, 5, 7, 10, 5, 6, 5, 5, 5, 5, 6, 4, 5, 9, 4, 5, 4, 3, 5, 5, 4, 4, 4, 6, 6, 10, 5, 5, 6, 5, 5, 5, 8, 3, 5, 10, 10, 12, 10, 18, 16, 8, 10, 14, 5, 11, 12, 18, 50

15'6" Dolomite, dark brownish-gray, micro to very finely crystalline, very hard and dense, occasional vertical white crystalline anhydrite veinlets, numerous irregular laminae black shale throughout, slight trace of fracturing, no show.

2'6" - Interlake - Dolomite, dark brownish-gray, micro to very finely crystalline, hard and dense, few pencil sized vugs lined with calcite crystals and containing some black asphaltic residue, no show.

2'0" Dolomite, light gray, micro-crystalline, very hard and dense, slightly fractured no show.

7'0" Dolomite, mottled and splotchy, white to light gray, very fine to medium crystalline, very hard, dense to very slightly inter-crystalline porosity, fairly well fractured, numerous pencil point to pencil sized vugs lined with medium dolomite crystals, very permeable, numerous minute gray stylolites throughout, slight H_2S odor on fresh break, brackish sulphur water taste, looks wet, no show.

1'6" Dolomite, brown, very finely crystalline, hard and dense, very few pencil point vugs, extremely fractured, no show.

11'6" Dolomite, white to light gray in top becoming light gray-brown in bottom, colors splotchy and irregular, very fine to finely crystalline, crystals not so clearly developed in white areas, questionable very slight inter-crystalline porosity, numerous pencil point to pencil sized vugs throughout, slight musty odor on fresh break, strong salty taste from freshly opened vugs, looks wet, no show.

7'0" Dolomite, light tanish-gray, micro to very finely crystalline, very hard and dense, fractured in bottom 1', no show.

2'0" Dolomite, light brownish-gray, very finely crystalline, very hard and dense, extremely fractured and broken, no show.

5'0" Dolomite, brown, very fine to finely crystalline, extremely hard, dense except for few scattered very small (pencil point) vugs, occasional slight fractures, broken in bottom 6", no show.

Core No. 60 8220 - 8278', recovered 58'
C.T. - 7, 3, 7, 3, 8, 6, 3, 7, 11, 9, 8, 8, 9, 11, 7, 5, 5, 10, 5, 10, 5, 6, 6, 8, 4, 7, 5, 16, 3, 6, 11, 10, 10, 9, 6, 11, 11, 10, 11, 10, 10, 10, 10, 10, 14, 13, 12, 13, 10, 11, 13, 10, 10, 15, 15, 18, 15, 15

58'0" Dolomite, light gray to light grayish-brown, becoming dark gray in thin streaks, very hard, dense except for scattered pencil point vugs, becoming very vugular (pencil sized) and white to light gray from 8272-8273 and 8275-8277, occasional fractures throughout core becoming more fractured toward base, vugs look very wet, taste salty, slight H_2S odor on fresh break, no show.

Core No. 61 8278 - 8336', recovered 57'
C.T. - 2, 3, 2, 4, 3, 6, 3, 3, 3, 6, 4, 3, 3, 4, 3, 2, 5, 6, 6, 6, 4, 3, 7, 4, 7, 7, 9, 6, 6, 6, 6, 5, 7, 7, 3, 5, 6, 4, 6, 5, 6, 8, 4, 5, 6, 5, 5, 5, 4, 5, 3, 4, 5, 3, 4, 3, 5, 5,

13'0" Dolomite, light grayish-brown to grayish brown, micro to very finely crystalline, very hard and dense except for top 3' which has very few scattered pencil point vugs, sulphur odor on fresh break, slight trace fracturing, no show.

25'0" Dolomite, light grayish-brown to grayish brown, micro to finely crystalline, hard, mostly dense, few irregular streaks very slight inter-crystalline porosity, few scattered pencil point to pencil sized vugs becoming fairly numerous in few very thin streaks, few occasional fractures, sulphur odor on fresh break, looks wet, no show.

19'0" Dolomite, light tan to tan and gray-brown, very finely crystalline becoming micro-crystalline in thin streaks, hard, dense except for occasional very thin streaks pencil point vugs, fractured from 8317-8319 and from 8326-8331, extremely broken 8333-8336, very slight H_2S odor on fresh break, looks wet in vugs, no show.

Core No. 62 8336 - 8356', recovered 17'
C.T. - 2, 3, 3, 8, 3, 7, 5, 7, 5, 5, 8, 7, 6, 7, 7, 5, 10, 13, 9, 12

1'0" Dolomite, brownish-gray, very fine to finely crystalline, hard, dense except for few scattered pencil point vugs, unit extremely fractured and broken so that relative position of pieces is unknown, some pieces have musty dead oil odor on fresh break, trace of dead oil stain in some vugs, few droplets dead oil noted on one incipient fracture plane, mass of unit looks wet.

16" Dolomite, light tanish-gray, finely crystalline with scattered medium to coarse crystals, dense except for few scattered pencil point vugs lined with dolomite crystals, slight musty dead oil odor on fresh break, some vugs have black asphaltic residue, mass of core looks wet, few fractures and incipient fractures.

3'6" Dolomite, light buff-gray, micro-crystalline to finely crystalline, hard, dense, except for rare pencil point vugs, moderately fractured with few incipient fractures, few fractures have flakes black asphaltic residue on planes, otherwise no show.

5'0" Dolomite, very light grayish-brown, micro to very finely crystalline, hard, dense except for rare pencil point vugs having flakes black asphaltic residue, fractured extremely broken in lower 4', no show other than asphaltic.

Core No. 63 8356 - 8406', recovered 50'
C.T. - 4, 5, 10, 12, 7, 12, 11, 10, 10, 12, 18, 10, 9, 10, 11 16, 12, 16, 17, 9, 7, 21, 7, 10, 9, 8, 9, 15, 22, 17, 16, 11, 19, 20, 20, 20, 23, 20, 20, 24, 18, 17, 13, 26, 27, 28, 27, 28, 29, 31

22'0" Dolomite, light grayish-brown to grayish-brown, micro to very finely crystalline, hard, dense, moderately fractured with spots of flakey black asphaltic residue on fracture planes, rare pencil point vugs which look wet and have some black asphaltic residue filling, otherwise no show, slight H_2S odor on fresh break.

8'0" Dolomite, brownish-gray to dark brownish-gray, micro to very finely crystalline, very hard, dense except for rare scattered pencil point vugs which look wet, fairly well fractured, some fractures filled with crystalline anhydrite, few black stylolitic partings with associated pyritics, slight H_2S odor on fresh break, no show.

10'0" Dolomite, light grayish-brown, slightly darker in very thin streaks giving banded appearance, micro to very finely crystalline, hard, dense, few slightly argillaceous partings, very few fractures, slightly incipient fractures, no show.

10'0" Dolomite, dark grayish-brown, micro crystalline becoming finely crystalline toward base, hard, dense except for rare pencil point vugs, few fractures throughout, extra fractured and broken 8403-8405', few slightly argillaceous streaks giving shale cleavage, no show.

Core No. 64 8406 - 8419', recovered 9'
C.T. - 7, 6, 8, 11, 17, 5, 4, 14, 19, 15, 16, 15, 17

9'0" Dolomite, grayish-brown in top becoming light grayish-tan toward base with occasional spots very light gray-white, very finely crystalline, fair vugular porosity, vugs irregular shaped, incipient fractures throughout, some partially filled fractures with crystalline anhydrite and dolomite, few streaks having minute veinlets black asphaltic matrix, trace black asphaltic in vugs and fractures, 1' streak from 8409-8410' has few small coral fossils having voids between septae, all porosity in core looks wet, no show other than asphaltic.

Core Description Continued

Core No. 65 8419 - 8477', recovered 58'
C.T. - 10, 10, 8, 5, 5, 7, 9, 7, 9, 6, 6, 7, 5, 9, 8, 10, 4, 7, 9, 5, 7, 6, 7, 7, 9, 8, 7, 7, 9, 13, 5, 8, 12, 22, 10, 13, 22, 20, 16, 12, 9, 15, 15, 15, 33, 30, 8, 28, 20, 20, 31, 22, 38, 15, 19, 20, 20, 17

2'0" Dolomite, mottled light to dary gray, very finely crystalline, hard, poor scattered pencil point vuggy porosity, some fracturing with anhydrite crystals along fracture planes having secondary inter-crystalline porosity, looks wet, no show.

6'0" Dolomite, light to medium brownish-gray, micro-crystalline, dense, hard, fractured with anhydrite crystals on fracture planes, no show.

10'0" Dolomite, light to dark gray, very fine to finely crystalline, hard, poor scattered pencil point vuggy porosity, some fracturing with anhydrite crystals along fracture, looks wet in streaks, no show.

12'0" Dolomite, light to medium grayish-brown, micro-crystalline, hard, trace tight fractures with anhydrite crystals along planes, poor scattered pencil point vuggy porosity at top appears wet; large pencil sized vugs toward base which look wet, salty, no show.

5'0" Dolomite, dark grayish-brown, massive to micro-crystalline, hard, dense, some horizontal cleavage, appears argillaceous in laminae, no show.

13'0" Dolomite, light gray to light grayish-brown, hard, becoming harder toward base, micro-crystalline, some tight vertical fractures, no show.

2'0" Dolomite, light to medium gray-brown, extremely hard, micro-crystalline, dense, one large white chert nodule, mass of core appears siliceous (scratches knife blade), no show.

8'0" Dolomite, light grayish-brown, very fine to finely crystalline, very hard, dense except for bottom 1' which has tight vertical fractures and trace of vuggy porosity, looks wet, no show.

Core No. 66 8477 - 8535', recovered 58'
C.T. - 5, 4, 4, 5, 5, 5, 5, 7, 11, 30, 16, 10, 15, 16, 17, 19, 18, 23, 36, 23, 25, 24, 24, 18, 22, 18, 21, 22, 24, 20, 30, 16, 13, 21, 22, 28, 10, 15, 17, 18, 15, 20, 15, 15, 30, 20, 20, 35, 20, 15, 24, 15, 15, 14, 15, 15, 25, 20

47'0" Dolomite, light gray-buff in top becoming light brownish-gray toward base, with few scattered very small to very large light gray massive chert nodules, very finely crystalline, extremely hard, probably siliceous, dense except for few scattered poorly developed pin point to thumb sized vugs, some vugs lined with quartzitic crystals, occasional incipient fracturing, dead oil stain in one vug, all vugs look wet, slight H_2S odor on fresh break.

11'0" Dolomite, light grayish-tan, micro-crystalline, extremely hard, probable slight siliceous, dense, very little fracturing, with few small to very large scattered light gray massive chert nodules, slight H_2S odor on fresh break, no show

Core No. 67 8535 - 8555', recovered 20'
C.T. - 10, 10, 10, 10, 10, 10, 15, 15, 13, 10, 10, 13, 17, 13, 13, 22, 20, 23, 30, 45

20'0" Dolomite, grayish-buff in top becoming light brownish-gray toward base, very finely crystalline, very hard and dense, fractured in upper 1'6" and in lower 8', numerous white irregular shaped chert nodules 8545-8546' and 8554-8555, few scattered very thin veinlets quartz, slight H_2S odor on fresh break, no show, few very dark gray pyritic shale partings 8552-8553.

Core No. 68 8555 - 8566', recovered 7'
C.T. - 11, 19, 22, 14, 16, 16, 15, 13, 17, 22, 30

6'0" Dolomite, light buff-gray, micro to very finely crystalline, very hard, dense except for rare pencil point vugs which look wet, fractured throughout, extremely fractured and broken in lower 1'6", very few finger sized nodules, white chert, dull yellow tan minute fluorescence, slight H_2S odor on fresh break, no show.

1'0" Dolomite, medium gray, micro to very finely crystalline, fairly hard, dense, fractured, numerous very thin laminae argillaceous dolomite throughout, no show.

Core No. 69 8566 - 8622', recovered 58'
C.T. - 3, 22, 22, 21, 23, 20, 20, 17, 15, 12, 15, 15, 18, 23, 11, 16, 22, 20, 20, 21, 20, 20, 15, 22, 22, 31, 34, 19, 18, 14, 32, 30, 8, 19, 18, 28, 24, 9, 39, 23, 23, 19, 20, 32, 35, 26, 20, 25, 26, 4, 29, 20, 26, 14, 19, 23

12'0" - Gunton - Dolomite, very dark gray to very dark brownish-gray, very finely crystalline, fractured 8571-8573, very hard, dense, numerous very thin streaks and partings black shale, anhydrite on fracture planes, no show.

14'0" Dolomite, brownish-gray, very fine to finely crystalline, very hard, dense except for slight amoung poor vugular porosity 8582-8583, few hairline quartz veinlets with trace of secondary inter-crystalline porosity, slight H_2S odor on fresh break, no show.

1'0" Dolomite, light brownish-gray to tan, micro-crystalline, very hard, dense, trace of incipient fracturing with anhydrite on fracture planes, no show.

2'0" Dolomite, medium gray, massive, fairly hard, dense, few dark gray shale partings, no show.

2'0" Dolomite, light brownish-gray, very fine to finely crystalline, very hard, dense, trace of fracturing, few hairline white anhydrite veinlets, no show.

1'6" Dolomite, very dark brownish-gray to black, massive to micro-crystalline, very hard and dense, no show.

9'6" Dolomite, mottled light and medium brownish-gray and brown, very finely crystalline, very hard, dense, some incipient fracturing, rare black shale partings, few hairline veinlets quartz, slight H_2S odor on fresh break, no show.

9'0" Dolomite, medium gray with dark gray bands, micro-crystalline, massive in thin streaks, very hard, dense, few hairline quartz veinlets.

2'6" Anhydrite, very dark brownish-gray, massive to micro-crystalline, fairly hard, dense, slightly argillaceous, shale cleavage, dolomitic, no show.

3'0" Dolomite, light brown, with very thin dark gray streaks giving banded appearance, micro-crystalline, dense, very hard, trace of incipient fracturing, no show.

1'6" Dolomite, light brown, micro to very finely crystalline, hard, dense, fractured with anhydrite crystals on fracture planes, scattered very small white anhydrite inclusions throughout, no show.

Core No. 70 8622 - 8680', recovered 58'
C.T. - 20, 27, 22, 18, 18, 17, 16, 12, 21, 11, 16, 12, 12, 15, 15, 16, 16, 16, 15, 15, 15, 15, 15, 15, 35, 15, 18, 17, 10, 18, 25, 11, 11, 18, 13, 15, 14, 20, 11, 15, 17, 11, 21, 13, 19, 18, 15, 30, 26, 12, 17, 30, 26, 14, 15, 24, 24, 10

4'0" Dolomite, dark gray to dark brownish-gray, very finely crystalline, very hard and dense, trace of fracturing and incipient fracturing, some color banding toward base, no show, slight H_2S odor on fresh break.

36'0" - Stony Mountain - Dolomite, medium to dark brownish-gray, very fine to finely crystalline, very hard, slight amount very poor spotty inter-crystalline porosity which looks wet, occasional prominent stylolitic partings, moderate amount incipient fracturing throughout, some scattered very poorly devitrified pencil point vuggy porosity, no show, slight H_2S odor on fresh break.

6'0" Dolomite, gray to brownish-gray, very fine to finely crystalline, very hard and dense, fractured with anhydrite on fracture planes, slight H_2S odor on fresh break, no show.

12'0" Dolomite, banded medium and very dark gray, micro to very finely crystalline, very hard and dense, numerous very thin lenses black shaley dolomite, argillaceous in very thin streaks, slight H_2S odor on fresh break, no show.

Core No. 71 8680 - 8686', recovered 6'
C.T. - 8, 12, 25, 10, 12, 11

6'0" Dolomite, dark brownish-gray, micro-crystalline, hard, dense, fractured 8680-8682 and 8685-8686', trace incipient fracturing throughout, no show.

Core No. 72 8686 - 8737', recovered 51'
C.T. - 10, 9, 16, 18, 12, 10, 10, 11, 8, 9, 9, 9, 6, 6, 7, 7, 7, 6, 8, 6, 6, 8, 11, 8, 8, 8, 7, 8, 7, 5, 7, 9, 8, 8, 9 9, 14, 13, 10, 14, 9, 12, 8, 16, 16, 28, 15, 20, 30

8'0" Dolomite, very dark gray, very finely crystalline, hard and dense, trace of incipient fracturing, very few white calcite inclusions, very slight trace of black asphaltic residue, occasional streaks having numerous very thin lenses black shaley dolomite, no show.

27'0" - Red River - Dolomite, light gray to very light gray, very finely crystalline becoming occasionally micro-crystalline, poor scattered vuggy pencil point porosity, spotted to even very slight inter-crystalline porosity, moderate amount fracturing and incipient fracturing throughout, anhydrite crystals on fracture planes, dense in few spots and thin streaks, slight H_2S odor on fresh break, no show.

16'0" Limestone, medium to dark brownish-gray, very fine to finely crystalline, hard, slight trace poor pencil point vugular porosity, fairly well fractured vertical and diagonal, anhydrite crystals on fracture planes, dolomitic, slight calcitic, fairly strong H_2S odor on fresh break.

Core No. 73 8737 - 8795, recovered
C.T. - 11, 18, 18, 17, 17, 9, 10, 10, 6, 6, 8, 14, 12, 6, 7, 2, 8, 8, 5, 16, 4, 7, 9, 6, 9, 8, 12, 6, 8, 9, 7, 8, 6, 10, 10, 11, 12, 14, 19, 16, 10, 23, 9, 20, 15, 19, 13, 9, 13, 14, 12, 17, 15, 13, 13, 22, 22, 28

3'0" Dolomite, medium to dark brownish-gray, hard, very fine to finely crystalline, slightly limey, argillaceous in part, some fracturing, no show.

2'6" Dolomite, dark brownish gray, hard, dense, very finely crystalline, thin partings, soft white gypsum and gray anhydrite, no show.

12'6" Gypsum, soft, white, crystalline, thin partings dark gray crystalline anhydrite becoming increasingly anhydritic toward base, no show.

10'0" Limestone, dirty gray-brown, hard, finely crystalline, dolomite, trace of inter-crystalline porosity in top, slightly wet in streaks, some tight fracturing with anhydrite crystals on fracture planes, no show.

3'0" Limestone, light gray, medium hard, fine to medium crystalline, sucrose texture in part, very thin irregular dark gray shale partings, trace of inter-crystalline porosity which is wet in streaks.

15'0" Limestone, medium to dark gray-brown, hard, dense, very finely crystalline, some calcite inclusions, thin veinlets white crystalline calcite, some fracturing toward base, no show.

7'0" Dolomite, dark brown, with gray-brown mottling, finely crystalline, hard, very slight trace of inter-crystalline porosity, trace of fracturing with anhydrite crystals on fracture planes, numerous irregular inclusions gray massive chert, slight H_2S odor on fresh break, no show.

5'0" Dolomite, very dark gray to brown, hard, dense, very finely crystalline, limey in part, appears anhydritic in part, argillaceous toward base with thin laminae black shale, no show.

Core No. 74 8795 - 8846', recovered 51'
C.T. - 8, 16, 11, 14, 9, 8, 7, 8, 7, 6, 7, 5, 11, 7, 6, 13, 8, 19, 7, 11, 13, 26, 15, 18, 14, 14, 15, 14, 15, 20, 10, 16, 14, 15, 22, 27, 10, 16, 18, 24, 17, 18, 26, 20, 25, 20, 22, 30, 22, 15, 43, 25

6'0" Anhydrite, dark gray to black, very finely crystalline, medium hard, dense, verydolomitic in top with numerous laminae black dolomite, becoming purer anhydrite toward base, slight H_2S odor on fresh break, no show.

7'0" Gypsum, white to very light gray, crystalline, soft, no show.

4'0" Dolomite, light brown, massive, dense, shatters on impact, numerous recemented fractures, cemented with white anhydrite and gypsum, no show.

4'0" Dolomite, brown, micro to very finely crystalline, hard, dense, trace of fracturing with numerous recemented fractures, numerous incipient fractures, anhydrite crystals on fracture planes with few quartz crystals, local concentration very small brown prismatic tourmaline crystals, shatters on impact, slight H_2S odor, no show.

16'0" Dolomite, brownish-gray, micro to very finely crystalline, shatters and fractures on impact, dense, extremely broken horizontally, no show.

12'0" Dolomite, light brown, gray to grayish-brown, massive, dense, shatters on impact, extremely broken horizontally in upper 4', few fractures recmented with quartz, fractured in lower 8', no show.

2'0" Dolomite, very dark brownish-gray, finely crystalline, extremely hard, dense, slightly fractured, few black stylolitic partings, very slight trace of very poor pencil point vugular porosity, no show.

Core No. 75 8846 - 8874', recovered 19'
C.T. - 9, 8, 6, 8, 6, 11, 5, 7, 6, 11, 4, 3, 6, 10, 6, 8, 8, 10, 9, 6, 9, 9, 11, 12, 9, 19, 40 (L.C.)

7'0" Dolomite, dark brown to brownish-gray, very fine to finely crystalline, spotted even very slight inter-crystalline porosity with trace scattered poorly developed pencil point porosity, occasional inclusions white dolomite and anhydrite, looks wet, slight H_2S odor on fresh break, no show.

5'6" Dolomite, dark brownish-gray, very fine to medium crystalline, with very numerous large irregular inclusions and streaks clear crystalline anhydrite with good inter-crystalline porosity both in anhydrite and dolomite, porosity in anhydrite inclusions reaches proportions of being vugular, some dead oil staining, strong musty odor on fresh break, strong bitter taste, looks wet.

6'6" Limestone, dark brownish-gray to brown, massive to microcrystalline with few scattered coarse crystals, dense, hard, fractured 8871'6"-8874', no show.

Core No. 76 8875 - 8933', recovered 58'
C.T. - 7, 8, 7, 9, 6, 5, 5, 7, 4, 5, 7, 8, 7, 8, 3, 6, 3, 8, 5, 7, 6, 7, 5, 7, 5, 7, 5, 6, 6, 7, 6, 4, 4, 4, 5, 5, 7, 6, 7, 5, 5, 8, 6, 6, 6, 7, 6, 5, 7, 7, 6, 6, 6, 5, 7, 8, 5, 5,

30'0" Limestone, dark brownish-gray to brownish to gray, micro and finely crystalline in top becoming massive toward base, coarsely crystalline and fossiliferous bracks 8897-8898, fairly hard, dense, slight H2S odor on fresh break, no show.

4'0" Dolomite, light brownish-gray at top becoming dark brownish-gray at base, very finely crystalline in top becoming micro to very finely crystalline at base with numerous coarse crystals scattered throughout, limey at base, some tight fracturing, otherwise dense, scattered black stylolites, H_2S odor on fresh break, no show.

24'0" Limestone, dark grayish brown to brownish gray, micro to very finely crystalline with few scattered medium to coarse crystals, fairly hard, dense, fractured 8909-8911' and 8928-8933, one coral found 8924, H_2S odor on fresh break, no show.

Core No. 77 8933 - 8992', recovered 59'
C.T. - 3, 5, 10, 12, 15, 12, 14, 12, 8, 9, 13, 15, 14, 7, 9, 14, 15, 11, 13, 12, 11, 8, 16, 12, 14, 12, 10, 10, 7, 13, 12, 18, 12, 3, 3, 10, 6, 8, 12, 5, 10, 5, 5, 6, 7, 9, 8, 4, 6, 8, 6, 5, 5, 10, 6, 8, 6, 5, (1' error)

26'0" Limestone, dark brownish-gray, micro to very finely crystalline, crystals poorly developed, medium hard, dense, very pronounced horizontal fracture, H_2S odor on fresh break, no show.

27'0" Limestone, gray in top becoming brownish-gray toward base, very fine to finely crystalline, with fairly numerous medium to coarse crystals scattered throughout, extremely hard, dense, few black stylolites, very slight trace fracturing, H_2S odor on fresh break, no show.

6'0" Alternating limestone and dolomite, brownish-gray to gray, very fine to finely crystalline, with scattered coarse crystals, trace of poor pencil point vuggy porosity, dense in streaks, fractured in lower and upper 2', one honeycomb coral found at 8987', H_2S odor on fresh break, all porosity looks wet, no show.

Core No. 78 8992 - 9047', recovered 55'
C.T. - 7, 6, 5, 6, 5, 4, 7, 4, 10, 6, 6, 6, 8, 6, 6, 4, 7, 6, 5, 6, 7, 7, 5, 5, 6, 7, 6, 6, 4, 6, 5, 5, 4, 7, 6, 7, 6, 6, 7, 7, 7, 6, 5, 10, 5, 5, 5, 7, 7, 6, 7, 5, 8, 20, 24

8'0" Alternating dolomitic limestone and calcareous dolomite, brownish-gray, very fine to finely crystalline, spotty, very slight inter-crystalline porosity, few black stylolites, few incipient fractures, some recemented fractures, H_2S odor on fresh break, looks wet, no show.

41'0" Limestone, brownish-gray, very fine to finely crystalline, very hard, dense, fractured 8917-8924, fractured and extremely broken 8929-8941', dolomitic in streaks, few black stylolites, H_2S odor on fresh break, no show.

6'0" - Winnipeg - Dolomite, dark steel gray, shiny, finely crystalline, extremely hard, dense, very calcareous streaks, very sandy throughout, approaching dolomitic sand, quartz grains fairly coarse, sub-rounded, some grains fracture on break, no show.

Core No. 79 9047 - 9055', recovered 8'
C.T. - 31, 62, 22, 30, 38, 67, 47, 50

2'0" Sand, light gray, fine to coarse grain, poorly assorted, fine grains angular, coarse grains sub-rounded, extremely hard, quartzitic, tight, fractured, calcareous, some color banding showing, cross bedding, strong sulphur odor on fresh break, no show.

6'0" Sand, gray to very dark gray, fine grained, with few scattered coarse grains, angular, very hard, quartzitic, tight, fractured in upper 1'6", some fractures filled with milky quartz in lower 4'6" with trace of inter-crystalline porosity, very slightly pyritic, some irregular color banding, no show.

Core No. 80 9055 - 9059', recovered 3'
C.T. - 62, 84, 89, 200

1'0" Sand, brownish-gray to dark gray, banded, fine grained, extremely hard, tight, quartzitic, trace tight fracturing, moderate amount very thin black streaks dolomite shale, with associated pyrites, sulphur odor on fresh break, no show.

1'6" Sand, very light gray to gray, banded, fine grained, glassy lustre, extremely hard, quartzitic, dense, some fracturing, fairly numerous black very thin wavy argillaceous streaks, with associated pyrites, sulphur odor on fresh break.

0'6" Sand, very light gray to gray, banded, medium to coarse grain, very hard, quartzitic, dense, fairly numerous amount very small disc shaped gray shale fracturings, few partings and very thin streaks black shale with associated pyrites, sulphur odor on fresh break, no show.

Core No. 81 9059 - 9065', recovered 5'
C.T. - 10, 10, 48, 37, 220, 335

2'0" Intermixed banded, light and dark gray sand and dolomitic shale, sand, very light gray to white, fine grained, very hard, tight, angular, with numerous fragments dark gray dolomitic shale scattered throughout, numerous very small masses pyrites, sulphur odor on fresh break, no show.

3'0" Quartzite, very light gray, finely crystalline, extremely hard, dense, few wavy dark gray argillaceous streaks giving banded appearance, sulphur odor on fresh break.

Core No. 82 9064 - 9088', recovered 24'
C.T. - 76, 183, 244, 360, 153, 66, 61, 90, 55, 83, 35, 46, 38, 45, 33, 45, 27, 47, 27, 28, 32, 37, 24, 25

5'0" Quartzite, very light buff gray, very fine to finely crystalline, extremely hard, dense except for few recemented fractures with trace inter-crystalline porosity which looks wet, pyritic in streaks, slight amount very dark gray to black irregular banding, sulphur odor on fresh break, no show.

5'6" Quartzite, gray-brown, very fine to finely crystalline, very hard, dense, with numerous wavy irregular laminae and very thin lenses very dark brown very hard shale, argillaceous throughout, pyritic, no show.

13'6" Shale, dark brownish-black to black, fairly hard in top, having excellent shale cleavage toward base, pyritic throughout, fossiliferous, (pelecy pods).

Core No. 83 9088 - 9102', recovered 14'
C.T. - 35, 42, 31, 35, 20, 34, 31, 39, 27, 25, 60, 191, 231 106

5'0" Shale, dark brownish-black to black, good shale cleavage, extremely broken and fractured.

6'6" Argillite, black, fairly hard, numerous very small rounded masses pyrites throughout, numerous concentration and scattered individually rounded medium sand grains, extremely broken and fractured except for bottom 1', no show.

2'6" - Winnipeg Sand - Quartzite, light buff to very light gray, banded, finely crystalline, extremely hard, dense, except for few recemented (calcite) fractures having trace of secondary inter-crystalline porosity, no show.

Core No. 84 9102 - 9108', recovered 6'
C.T. - 50, 29, 54, 68, 99, 239

6'0" Quartzite, white to very light gray, few irregular wavy very thin dark gray bands, finely crystalline, extremely hard, very slight porosity, no permeability, strong sulphur odor on fresh break, slightly wet look, no show, moderate amount recemented (anhydrite) fractures with some inter-crystalline porosity, looks wet.

Core No. 85 9108 - 9112', recovered 4'
C.T. - 593, 16, 193, 191

4'0" Quartzite, white to very light gray, few irregular wavy very thin dark gray bands, finely crystalline, extremely hard, very slight porosity, no permeability, some recemented fractures (anhydrite cement), with some inter-crystalline porosity, all porosity looks wet, strong sulphur odor on fresh break, no show.

Core No. 86 9012 - 9020', recovered 8'
C.T. - 130, 163, 50, 40, 69, 173, 131, 304

8'0" Quartzite, white to very light gray with few spots and wavy laminae dark gray, very fine to finely crystalline, extremely hard, dense except for few recemented fractures in upper 3' and some fairly good fracturing in lower 5' which has anhydrite crystals on fracture planes, strong pungent sulphur odor on fresh break, no show.

Core No. 87 9120 - 9121', recovered 6"
C.T. - 298

0'6" Quartzite, very light gray, finely crystalline, extremely hard, dense, fractured with anhydrite crystals on fracture planes, strong pungent sulphur odor on fresh break, no show.

Core No. 88 9121 - 9127', recovered 5'
C.T. - 316, 260, 242, 255, 376, 504

5'0" Quartzite, very light gray, finely crystalline, extremely hard, dense, fractured with anhydrite crystals on fracture planes, strong pungent sulphur odor on fresh break, no show.

Core No. 89 9127 - 9137', recovered 11'
C.T. - 40, 70, 35, 50, 77, 88, 138, 152, 255, 450

11'0" Quartzite, white, very light gray, very fine to finely crystalline, extremely hard, dense except for some tight fracturing with anhydrite on fracture planes, strong pungent sulphur odor, no show.

Core No. 90 9137 - 9145', recovered 7'
C.T. - 15, 40, 40, 50, 95, 112, 356, 372

7'0" Quartzite, white to very light gray, very fine to finely crystalline, extremely hard, dense except for some fairly well developed fracturing, ½" lense gray sandy pyritic argillite at 4140', strong pungent sulphur odor on fresh break, no show.

Core No. 91 9145 - 9153', recovered 8'
C.T. - 60, 180, 182, 105, 238, 242, 165, 278

3'0" Quartzite, white, very fine to finely crystalline, extremely hard, dense to very slight porosity, no permeability, some tight fracturing, strong pungent sulphur odor on fresh break, no show.

5'0" Quartzite, very light buff to gray, very fine to finely crystalline, extremely hard, dense except for a trace very tight fracturing, some very thin dark gray irregular banding, slightly pyritic in bottom 6", strong pungent sulphur odor on fresh break, looks wet, questionable salty taste, no show.

Core No. 92 9153 - 9154' NO RECOVERY

Core No. 93 9154 - 9163', recovered 10' (picked up 1' of previous core)
C.T. - 385, 73, 72, 92, 107, 171, 240, 150, 730

4'0" Quartzite, very light buff gray, very fine to finely crystalline, extremely hard and dense; dark gray very thin irregular bands, strong pungent sulphur odor on fresh break, few recemented fractures, no show.

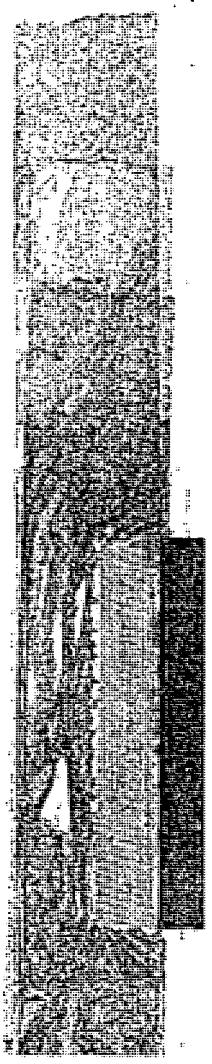
4'6" Quartzite, very dark slight brownish-gray, very finely crystalline, extremely hard and dense except for few recemented fractures, some secondary inter-crystalline porosity in white dolomite cementing material, entire unit questionably slightly argillaceous, no show.

0'6" Quartzite, very dark gray to black, very hard, dense, extremely argillaceous and shaley, no show.

1'0" Quartzite, very light buff to gray, finely crystalline, extremely hard, dense trace tight fracturing, no show.

T. D. SIM 9163'

CORE ANALYSIS REPORT



CORE ANALYSIS REPORT

Company C.H. MURPHY JR. ET.AL. Well No. 1 Location SW NE Sec. 2, T29N-R51E

Field Wildcat County Roosevelt State Montana

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
	Core No. 1 (2367-2375') - GREENHORN				
2368	0.0	13.2	15.1	28.6	Nil
2370	0.0	7.9	41.0	59.0	Nil
2372	0.0	9.2	39.2	51.6	Nil
2374	0.0	8.4	15.9	38.4	Nil
	Core No. 2 (4776-4786') - AMSDEN				
4776.5	0.0	4.0	0.0	38.2	Nil
4777.5	0.0	6.1	0.0	19.8	Nil
4778.5	0.0	1.6	0.0	60.4	Nil
4779.5	0.0	1.7	0.0	17.7	Nil
4780.5	0.0	4.1	12.0	30.1	Nil
4781.5	0.0	2.6	0.0	37.2	Nil
4782.5	0.0	2.2	0.0	44.5	Nil
4783.5	0.0	2.0	12.9	38.8	Nil
	Core No. 3 (5174-5184') - KIBBEY SAND				
5174.5	44.8	16.3	21.0	54.6	Oil
5175.5	53.0	13.1	24.2	65.2	Oil
5176.5	10.5	11.7	4.0	68.5	Water
5177.5	3.6	7.7	5.7	31.6	Water
5178.5	0.0	4.0	11.3	67.8	Nil
5179.5	.4	12.7	3.3	54.4	Water
5180.5	.4	10.4	4.7	68.2	Water
5181.5	.1	10.3	4.7	87.0	Nil
5182.5	0.0	10.0	4.7	54.0	Nil
5183.6	.1	12.3	3.8	26.8	Nil
	Core No. 4 (5184-5223') - KIBBEY SAND				
5185.5	29.7	16.3	0.0	70.4	Water
5186.5	33.4	13.3	0.0	55.2	Water
5187.5	72.0	17.9	0.0	87.8	Water
5188.5	129.0	18.8	0.0	87.6	Water
5189.5	143.0	20.3	0.0	69.7	Water
5190.5	18.9	20.3	0.0	67.1	Water
5191.5	18.9	11.9	0.0	93.4	Water
5192.5	0.0	6.5	0.0	68.7	Nil
5193.5	0.0	7.1	0.0	68.3	Nil
5194.5	23.1	13.0	0.0	62.1	Water

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 4 - Continued			
5195.5	0.0	5.0	0.0	100.0	Nil
5196.5	0.0	6.6	0.0	72.3	Nil
5197.5	0.0	3.4	0.0	74.2	Nil
5202.5	0.0	5.1	0.0	58.2	Nil
5203.5	4.4	13.8	0.0	47.2	Water
5204.5	0.0	9.2	0.0	42.9	Nil
5205.5	0.0	6.9	0.0	100.0	Nil
5206.5	0.0	8.4	0.0	57.0	Nil
5207.5	0.0	3.8	0.0	49.3	Nil
5212.5	0.0	7.7	0.0	46.6	Nil
5213.5	0.0	4.4	0.0	71.3	Nil
5214.5	7.7	7.2	0.0	51.0	Water
5220.5	0.0	6.0	0.0	36.3	Nil
5221.5	1.4	8.8	0.0	36.6	Water
5222.5	0.0	7.9	0.0	35.0	Nil
		Core No. 5 (5682-5692') - "B-3"			
5682.5	.5	17.4	2.5	97.5	Water
5683.5	.1	20.3	7.7	92.1	Nil
5684.5	.3	17.6	0.0	67.7	Water
5685.5	0.0	12.8	0.0	100.0	Nil
5686.5	0.0	14.4	3.1	88.1	Nil
5687.5	.1	15.3	0.0	85.0	Nil
5688.5	0.0	1.3	39.6	59.5	Nil
5689.5	0.0	0.0	0.0	0.0	Nil
5690.5	0.0	5.5	0.0	81.4	Nil
5691.5	0.0	4.4	0.0	75.9	Nil
		Core No. 7 (5753-5800') - "C-2"			
5795.5	0.0	1.1	47.6	40.5	Nil
5796.5	0.0	1.8	25.2	74.8	Nil
5797.5	0.0	4.8	10.2	35.8	Nil
5798.5	0.0	3.0	16.4	83.7	Nil
5799.5	0.0	3.5	28.6	71.4	Nil
		Core No. 8 (5810-5818') - MISSION CANYON			
5810.5	0.0	8.0	29.5	69.5	Nil
5811.5	0.0	5.5	19.9	79.4	Nil
5812.5	0.0	5.8	18.8	64.0	Nil
5813.5	0.0	9.3	26.1	33.3	Nil
5814.5	0.0	13.3	23.0	27.9	Nil
5815.5	0.0	10.6	29.5	29.5	Nil
5816.6	0.0	10.6	22.6	32.0	Nil
5817.5	0.0	10.6	40.3	26.9	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 9 (5822-5830') - MISSION CANYON			
5822.5	0.0	7.0	0.0	65.3	Nil
5823.5	0.0	8.6	0.0	35.9	Nil
5824.5	0.0	7.2	0.0	60.8	Nil
5825.5	0.0	7.1	0.0	45.6	Nil
5826.5	0.0	4.4	0.0	43.0	Nil
5827.5	0.0	1.2	0.0	79.2	Nil
5828.5	0.0	5.1	0.0	47.3	Nil
5829.5	0.0	4.8	25.0	40.0	Nil
		Core No. 10 (5830-5880') - MISSION CANYON			
5830.5	0.0	7.2	0.0	33.0	Nil
5831.5	0.0	1.0	0.0	18.5	Nil
5832.5	0.0	4.6	0.0	35.8	Nil
5833.5	0.0	4.9	0.0	34.2	Nil
5834.5	0.0	3.8	0.0	31.2	Nil
5835.5	0.0	4.5	0.0	36.6	Nil
5836.5	0.0	5.4	0.0	47.0	Nil
5837.5	0.0	6.3	0.0	43.8	Nil
5838.5	0.0	6.9	0.0	30.5	Nil
5839.5	0.0	8.5	0.0	81.7	Nil
5840.5	0.0	3.8	0.0	25.1	Nil
5841.5	0.0	6.1	0.0	15.0	Nil
5842.5	0.0	2.5	0.0	30.1	Nil
5843.5	0.0	2.0	0.0	35.1	Nil
5844.5	0.0	4.1	0.0	22.9	Nil
5845.5	0.0	3.0	0.0	22.7	Nil
5846.5	0.0	2.7	0.0	25.9	Nil
5847.5	0.0	3.3	0.0	0.0	Nil
5848.5	0.0	3.0	0.0	31.7	Nil
5849.5	0.0	2.3	0.0	0.0	Nil
5850.5	0.0	4.3	0.0	0.0	Nil
5851.5	0.0	4.5	0.0	21.5	Nil
5852.5	0.0	6.3	0.0	11.4	Nil
5853.5	0.0	6.0	0.0	12.5	Nil
5854.5	0.0	2.4	0.0	31.4	Nil
5855.5	0.0	2.5	9.5	15.6	Nil
5856.5	0.0	7.2	18.8	27.9	Nil
5857.5	0.0	14.0	0.0	6.9	Nil
5858.5	0.0	2.8	0.0	41.8	Nil
5859.5	0.0	1.3	0.0	99.8	Nil
5860.5	0.0	0.9	0.0	13.4	Nil
5861.5	0.0	1.0	0.0	76.7	Nil
5862.5	0.0	0.4	0.0	18.1	Nil
5863.5	0.0	1.2	0.0	0.0	Nil
5864.5	0.0	2.3	0.0	32.7	Nil
5865.5	0.0	0.7	0.0	13.7	Nil
5866.5	0.0	1.5	0.0	48.8	Nil
5867.5	0.0	1.1	0.0	0.0	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 10 - Continued			
5868.5	0.0	4.9	0.0	0.0	Nil
5869.5	0.0	4.0	0.0	17.2	Nil
5870.5	0.0	3.4	0.0	20.1	Nil
5871.5	0.0	2.7	0.0	36.8	Nil
5872.5	0.0	2.1	0.0	47.9	Nil
5873.5	0.0	3.0	0.0	30.8	Nil
5874.5	0.0	3.6	0.0	19.4	Nil
5875.5	0.0	2.5	0.0	33.3	Nil
5876.5	0.0	1.9	0.0	50.5	Nil
5877.5	0.0	1.5	0.0	46.9	Nil
5878.5	0.0	2.0	0.0	48.6	Nil
5879.5	0.0	2.0	0.0	49.7	Nil
		Core No. 11 (5881-5900') - MISSION CANYON			
5881.5	0.0	3.3	0.0	42.0	Nil
5882.5	0.0	1.8	0.0	0.0	Nil
5883.5	0.0	1.8	0.0	0.0	Nil
5884.5	0.0	2.1	0.0	0.0	Nil
5885.5	0.0	0.0	0.0	0.0	Nil
5886.5	0.0	2.5	0.0	0.0	Nil
5887.5	0.0	3.8	34.5	51.8	Nil
5888.5	0.0	5.5	19.8	19.8	Nil
5889.5	0.0	4.2	10.7	21.4	Nil
5890.5	0.0	3.0	15.7	0.0	Nil
5891.5	0.0	3.7	0.0	0.0	Nil
5892.5	0.0	2.2	0.0	0.0	Nil
5893.5	0.0	3.7	0.0	24.5	Nil
5894.5	0.0	5.7	0.0	16.4	Nil
5895.5	0.0	1.5	0.0	0.0	Nil
5896.5	0.0	1.9	0.0	0.0	Nil
5897.5	0.0	3.7	0.0	0.0	Nil
5898.5	0.0	2.9	0.0	24.2	Nil
		Core No. 12 (5900-5915') - MISSION CANYON			
5900.5	0.0	4.7	21.9	26.3	Nil
5901.5	0.0	2.6	18.3	55.0	Nil
5902.5	0.0	2.5	18.4	74.0	Nil
5903.5	0.0	1.5	0.0	62.6	Nil
5904.5	0.0	3.2	0.0	29.4	Nil
5905.5	0.0	1.7	0.0	56.5	Nil
5906.5	0.0	3.6	0.0	25.0	Nil
5907.5	0.0	2.3	48.5	48.5	Nil
5908.5	0.0	2.0	60.5	39.5	Nil
5909.5	0.0	1.2	36.0	63.0	Nil
5910.5	0.0	1.1	0.0	84.7	Nil
5911.5	0.0	1.3	0.0	50.0	Nil
5912.5	0.0	1.6	0.0	70.6	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 12 - Continued			
5913.5	0.0	2.2	0.0	51.0	Nil
5914.5	0.0	1.9	0.0	41.3	Nil
		Core No. 13 (5915-5926') - MISSION CANYON			
5915.5	0.0	3.0	15.3	38.4	Nil
5916.5	0.0	2.4	18.5	36.9	Nil
5917.5	0.0	1.3	0.0	68.2	Nil
5918.5	0.0	2.3	0.0	46.7	Nil
5919.5	0.0	4.0	0.0	38.6	Nil
5920.5	0.0	3.3	0.0	48.6	Nil
5921.5	0.0	4.9	0.0	26.6	Nil
5922.5	0.0	2.3	0.0	38.9	Nil
5923.5	0.0	2.8	0.0	31.9	Nil
5924.5	0.0	2.3	0.0	39.8	Nil
		Core No. 14 (5926-5936') - MISSION CANYON			
5926.5	0.0	2.0	0.0	26.9	Nil
5927.5	0.0	2.4	0.0	29.5	Nil
5928.5	0.0	2.0	0.0	39.3	Nil
5929.5	0.0	2.3	0.0	50.5	Nil
5930.5	0.0	1.7	0.0	82.7	Nil
5931.5	0.0	2.3	0.0	76.8	Nil
5932.5	0.0	1.1	0.0	61.5	Nil
5933.5	0.0	2.2	0.0	97.0	Nil
5934.5	0.0	2.8	0.0	30.2	Nil
5935.5	0.0	2.9	0.0	28.3	Nil
		Core No. 15 (5936-5960') - MISSION CANYON			
5936.5	0.0	1.0	0.0	86.0	Nil
5937.5	0.0	1.7	0.0	44.0	Nil
5938.5	0.0	1.1	0.0	68.2	Nil
5939.5	0.0	2.0	0.0	64.0	Nil
5940.5	0.0	2.0	0.0	97.0	Nil
5941.5	0.0	1.6	0.0	95.5	Nil
5942.5	0.0	1.0	0.0	75.5	Nil
5943.5	0.0	1.1	0.0	79.6	Nil
5944.5	0.0	1.8	0.0	41.7	Nil
5945.5	0.0	1.6	0.0	46.7	Nil
5946.5	0.0	2.6	0.0	97.0	Nil
5947.5	0.0	1.2	0.0	93.4	Nil
5948.5	0.0	2.7	0.0	97.8	Nil
5949.5	0.0	1.1	0.0	91.5	Nil
5950.5	0.0	1.0	0.0	98.5	Nil
5951.5	0.0	1.0	0.0	91.0	Nil
5952.5	0.0	3.7	0.0	21.9	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 15 - Continued			
5953.5	0.0	1.0	0.0	91.9	Nil
5954.5	0.0	1.2	0.0	53.6	Nil
5955.5	0.0	1.8	0.0	41.3	Nil
5956.5	0.0	1.0	0.0	89.9	Nil
5957.5	0.0	1.7	0.0	44.9	Nil
5958.5	0.0	1.9	0.0	89.9	Nil
5959.5	0.0	0.8	0.0	95.0	Nil
		Core No. 16 (5962-5995') - MISSION CANYON			
5962.5	0.0	1.7	0.0	47.5	Nil
5963.5	0.0	1.4	0.0	42.0	Nil
5964.5	0.0	2.0	0.0	50.6	Nil
5965.5	0.0	2.3	0.0	42.6	Nil
5971.5	0.0	1.6	28.5	67.2	Nil
5972.5	0.0	1.5	29.1	58.2	Nil
5973.5	0.0	1.3	34.0	60.0	Nil
5974.5	0.0	1.2	0.0	63.0	Nil
		Core No. 18 (6009-6034') - MISSION CANYON			
6009.5	0.0	1.1	0.0	54.2	Nil
6010.5	0.0	1.5	0.0	39.8	Nil
6011.5	0.0	1.3	35.1	52.6	Nil
6014.5	0.0	1.1	0.0	52.3	Nil
6015.5	1.9	5.1	33.6	12.7	Oil
6016.5	0.1	2.5	59.5	25.4	Oil
6018.5	1.7	4.3	47.5	28.4	Oil
		Core No. 19 (6034-6090') - MISSION CANYON			
6075.5	0.0	4.2	32.4	25.9	Nil
6076.5	0.0	3.8	28.4	22.7	Nil
6077.5	0.0	3.9	11.9	23.8	Nil
6078.5	0.0	2.3	0.0	36.4	Nil
6081.5	0.0	3.0	37.6	22.5	Nil
6082.5	0.0	4.6	21.8	23.2	Nil
6083.5	0.0	4.8	23.1	15.4	Nil
6084.5	0.0	5.0	25.6	17.1	Nil
6085.5	0.0	4.9	28.4	18.9	Nil
6086.5	0.0	3.6	38.6	32.2	Nil
6087.5	0.0	4.2	32.2	21.4	Nil
6088.5	0.0	3.6	38.5	25.7	Nil
6089.5	0.0	3.7	0.0	30.2	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	Core No. 20 (6090-6145') - MISSION CANYON				
6090.5	1.8	6.4	21.8	15.6	Oil
6096.5	0.0	3.5	40.8	18.8	Nil
6097.5	0.1	2.7	37.5	30.0	Oil
6098.5	0.2	2.9	50.0	35.0	Oil
6099.5	0.0	4.2	26.6	17.9	Nil
6100.5	0.1	8.3	18.3	10.5	Oil
6101.5	0.0	1.0	21.2	11.8	Nil
6102.5	2.4	6.1	24.2	22.3	Oil
6104.5	0.0	2.4	49.5	45.0	Nil
6105.5	0.0	4.1	25.2	23.0	Nil
6110.5	0.1	9.0	33.0	17.8	Oil
6111.5	0.0	11.5	37.6	20.7	Nil
6112.5	0.0	8.0	44.7	50.3	Nil
6113.5	0.0	3.1	46.6	50.2	Nil
6116.5	0.0	4.2	37.8	30.4	Nil
6118.5	0.0	1.6	29.6	59.2	Nil
6123.5	1.9	6.3	31.7	57.2	Oil
6124.5	0.0	9.7	23.4	30.6	Nil
6125.5	0.0	9.9	47.3	47.3	Nil
6126.5	0.0	11.2	21.3	50.2	Nil
6127.5	0.0	16.0	8.4	44.7	Nil
6128.5	0.0	8.7	13.5	15.8	Nil
6129.5	0.0	9.0	14.2	14.2	Nil
6130.5	0.0	11.3	20.6	72.1	Nil
6131.5	Trace	4.6	47.2	44.8	Oil
6132.5	Trace	3.4	39.2	22.8	Oil
6133.5	0.0	5.6	38.5	19.3	Nil
6134.5	0.0	3.2	52.0	29.3	Nil
6135.5	0.0	2.0	20.3	30.4	Nil
	Core No. 21 (6147-6203') - MISSION CANYON				
6147.5	0.1	2.9	38.1	30.5	Oil
6149.5	0.0	2.9	0.0	22.9	Nil
6151.5	0.2	4.7	31.4	19.5	Nil
6153.5	0.1	5.1	39.1	22.2	Nil
6155.5	0.1	7.1	25.1	37.3	Nil
6157.5	0.0	3.8	44.5	22.2	Nil
6159.5	0.4	3.8	35.1	35.1	Oil
6161.5	0.3	8.1	22.6	42.3	Oil
6163.5	1.0	9.9	24.3	53.1	Oil
6165.5	0.3	4.2	32.7	21.8	Oil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 21 - Continued			
6167.5	Trace	2.7	46.3	37.9	Oil
6169.5	0.1	4.4	43.9	24.3	Oil
6171.5	0.1	6.5	18.4	19.0	Oil
6173.5	0.2	4.7	24.0	24.0	Oil
6175.5	0.9	4.6	28.4	21.3	Oil
6177.5	4.0	4.6	32.7	20.1	Oil
6179.5	0.4	5.6	23.6	13.8	Oil
6181.5	1.1	4.7	32.4	20.8	Oil
6183.5	0.3	4.1	11.0	22.0	Oil
6185.5	0.3	4.4	10.5	36.7	Oil
6188.5	0.6	4.1	10.9	38.2	Oil
6192.5	0.6	4.8	29.9	29.9	Oil
6195.5	0.6	8.5	13.3	13.3	Oil
6199.5	0.8	6.1	0.0	12.6	Gas
6202.5	17.3	5.4	0.0	15.6	Gas
		Core No. 22 (6203-6258') - MISSION CANYON			
6204.5	1.9	5.0	0.0	16.6	Gas
6206.5	0.4	5.8	0.0	14.3	Gas
6207.5	0.0	8.9	0.0	30.4	Nil
6208.5	0.4	5.6	20.6	27.5	Gas-Oil
6210.5	0.3	6.9	13.5	18.9	Gas-Oil
6212.5	0.9	3.5	0.0	63.0	Gas
6214.5	0.3	9.0	4.5	11.3	Gas-Oil
6216.5	0.9	7.3	18.4	52.2	Oil
6218.5	0.6	7.7	16.8	16.8	Oil
6220.5	1.2	5.6	31.2	31.2	Oil
6222.5	0.5	6.4	6.6	13.2	Gas-Oil
6224.5	1.0	7.7	5.7	34.2	Gas-Oil
		Core No. 23 (6258-6314') - MISSION CANYON			
6260.5	0.0	1.1	0.0	0.0	Nil
6265.5	0.0	2.4	0.0	0.0	Nil
6270.5	0.0	1.2	0.0	0.0	Nil
6275.5	0.0	2.9	0.0	40.1	Nil
6280.5	0.0	3.0	0.0	40.3	Nil
6285.5	0.0	2.3	0.0	30.4	Nil
6290.5	0.0	1.5	0.0	46.2	Nil
6295.5	0.0	3.3	0.0	53.4	Nil
6300.5	0.0	2.3	0.0	28.9	Nil
6305.5	0.0	10.5	12.4	18.7	Nil
6310.5	0.0	3.6	0.0	0.0	Nil
		Core No. 24 (6314-6372') - MISSION CANYON			
6316.5	0.7	3.1	0.0	46.1	Nil
6320.5	Trace	3.2	0.0	65.0	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
		Core No. 24 - Continued			
6325.5	0.0	2.3	0.0	41.3	Nil
6329.5	0.0	2.2	0.0	44.3	Nil
6334.5	0.6	6.5	0.0	29.0	Nil
6339.5	0.0	2.8	0.0	38.5	Nil
6344.5	0.0	2.0	0.0	48.0	Nil
6349.5	0.0	5.2	0.0	32.2	Nil
6354.5	0.0	3.1	0.0	44.7	Nil
6359.5	0.0	2.0	0.0	52.6	Nil
6364.5	0.0	3.8	29.8	35.7	Nil
6369.5	Trace	12.6	3.8	37.8	Nil
		Core No. 25 (6372-6430') - MISSION CANYON			
6372.5	0.0	4.4	0.0	0.0	Nil
6375.5	0.0	1.9	0.0	42.5	Nil
6380.5	0.0	5.0	0.0	18.0	Nil
6385.5	0.0	4.5	0.0	20.4	Nil
6390.5	0.0	3.3	0.0	27.0	Nil
6395.5	0.0	1.9	0.0	70.2	Nil
6400.5	0.0	1.6	0.0	35.9	Nil
6405.5	0.0	2.2	0.0	0.0	Nil
6410.5	0.0	3.2	0.0	27.8	Nil
6415.5	0.0	4.5	0.0	15.8	Nil
6420.5	0.0	0.9	0.0	0.0	Nil
6425.5	0.0	2.0	0.0	34.6	Nil
		Core No. 26 (6430-6488') - MISSION CANYON			
6430.5	0.0	6.5	0.0	10.1	Nil
6435.5	0.0	0.0	0.0	0.0	Nil
6440.5	0.0	0.0	0.0	0.0	Nil
6445.5	0.0	0.0	0.0	0.0	Nil
6450.5	0.0	1.3	0.0	0.0	Nil
6455.5	0.0	1.3	0.0	0.0	Nil
6460.5	0.0	0.0	0.0	0.0	Nil
6465.5	0.0	5.0	0.0	16.9	Nil
6470.5	0.0	0.0	0.0	0.0	Nil
6475.5	0.0	4.5	0.0	0.0	Nil
6480.5	0.0	0.0	0.0	0.0	Nil
6485.5	0.0	0.0	0.0	0.0	Nil
		Core No. 27 (6488-6528') - MISSION CANYON			
6490.5	0.0	0.0	0.0	0.0	Nil
6495.5	0.0	0.0	0.0	0.0	Nil
6500.5	0.0	0.0	0.0	0.0	Nil
6505.5	0.0	0.0	0.0	0.0	Nil
6510.5	0.0	0.0	0.0	0.0	Nil
6515.5	0.0	0.0	0.0	0.0	Nil
6520.5	0.0	0.0	0.0	0.0	Nil
6525.5	0.0	0.0	0.0	0.0	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
		Core No. 28 (6530-6588') - MISSION CANYON			
6530.5	0.0	0.0	0.0	0.0	Nil
6535.5	0.0	0.0	0.0	0.0	Nil
6540.5	0.0	0.0	0.0	0.0	Nil
6545.5	0.0	0.0	0.0	0.0	Nil
6550.5	0.0	0.0	0.0	0.0	Nil
6555.5	0.0	0.0	0.0	0.0	Nil
6560.5	0.0	0.0	0.0	0.0	Nil
6565.5	0.0	0.0	0.0	0.0	Nil
		LODGEPOLE			
6570.5	0.0	0.0	0.0	0.0	Nil
6575.5	0.0	0.0	0.0	0.0	Nil
6580.5	0.0	0.0	0.0	0.0	Nil
6585.5	0.0	0.0	0.0	0.0	Nil
		Core No. 29 (6588-6646') - LODGEPOLE			
6588.5	0.0	0.0	0.0	0.0	Nil
6593.5	0.0	0.0	0.0	0.0	Nil
6598.5	0.0	0.0	0.0	0.0	Nil
6603.5	0.0	0.0	0.0	0.0	Nil
6608.5	0.0	0.0	0.0	0.0	Nil
6613.5	0.0	0.0	0.0	0.0	Nil
6618.5	0.0	0.0	0.0	0.0	Nil
6623.5	0.0	0.0	0.0	0.0	Nil
6628.5	0.0	0.0	0.0	0.0	Nil
6633.5	0.0	0.0	0.0	0.0	Nil
6638.5	0.0	0.0	0.0	0.0	Nil
6643.5	0.0	0.0	0.0	0.0	Nil
		Core No. 30 (6646-6704') - LODGEPOLE			
6646.5	0.0	0.0	0.0	0.0	Nil
6656.5	0.0	0.0	0.0	0.0	Nil
6666.5	0.0	0.0	0.0	0.0	Nil
6676.5	0.0	0.0	0.0	0.0	Nil
6686.5	0.0	0.0	0.0	0.0	Nil
6696.5	0.0	0.0	0.0	0.0	Nil
		Core No. 31 (6704-6762') - LODGEPOLE			
6704.5	0.0	0.0	0.0	0.0	Nil
6714.5	0.0	0.0	0.0	0.0	Nil
6724.5	0.0	0.0	0.0	0.0	Nil
6734.5	0.0	0.0	0.0	0.0	Nil
6744.5	0.0	0.0	0.0	0.0	Nil
6754.5	0.0	0.0	0.0	0.0	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	Core No. 32 (6762-6821') - LODGEPOLE				
6764.5	0.0	0.0	0.0	0.0	Nil
6774.5	0.0	0.0	0.0	0.0	Nil
6784.5	0.0	0.0	0.0	0.0	Nil
6794.5	0.0	0.0	0.0	0.0	Nil
6804.5	0.0	0.0	0.0	0.0	Nil
6814.5	0.0	0.0	0.0	0.0	Nil
	Core No. 33 (6821-6879') - LODGEPOLE				
6824.5	0.0	0.0	0.0	0.0	Nil
6834.5	0.0	0.0	0.0	0.0	Nil
6844.5	0.0	0.0	0.0	0.0	Nil
6854.5	0.0	0.0	0.0	0.0	Nil
6864.5	0.0	0.0	0.0	0.0	Nil
6874.5	0.0	0.0	0.0	0.0	Nil
	Core No. 34 (6879-6937') - LODGEPOLE				
6884.5	0.0	0.0	0.0	0.0	Nil
6894.5	0.0	0.0	0.0	0.0	Nil
6904.5	0.0	0.0	0.0	0.0	Nil
6914.5	0.0	0.0	0.0	0.0	Nil
6924.5	0.0	0.0	0.0	0.0	Nil
6934.5	0.0	0.0	0.0	0.0	Nil
	Core No. 35 (6937-6995') - LODGEPOLE				
6946.5	0.0	0.0	0.0	0.0	Nil
6959.5	0.0	0.0	0.0	0.0	Nil
6964.5	0.0	0.0	0.0	0.0	Nil
6969.5	0.0	0.0	0.0	0.0	Nil
6974.5	0.0	0.0	0.0	0.0	Nil
6979.5	0.0	0.0	0.0	0.0	Nil
6984.5	0.0	0.0	0.0	0.0	Nil
6989.5	0.0	0.0	0.0	0.0	Nil
6994.5	0.0	0.0	0.0	0.0	Nil
	Core No. 36 (6995-7035') -LODGEPOLE				
6999.5	0.0	0.0	0.0	0.0	Nil
7009.5	0.0	0.0	0.0	0.0	Nil
7019.5	0.0	0.0	0.0	0.0	Nil
7029.5	0.0	0.0	0.0	0.0	Nil
	Core No. 37 (7035-7075') - LODGEPOLE				
7035.5	0.0	0.0	0.0	0.0	Nil
7045.5	0.0	0.0	0.0	0.0	Nil
7055.5	0.0	0.0	0.0	0.0	Nil
7065.5	0.0	0.0	0.0	0.0	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
		Core No. 41 (7252-7310 - BAKKEN			
7291.5	0.0	0.0	0.0	0.0	Nil
		Core No. 45 (7400-7458') - DUPEROW			
7456-58	0.0	12.5	4.0	7.1	Nil
		Core No. 46 (7458-7516') - DUPEROW			
7456.5	0.0	11.9	4.3	8.6	Nil
7460.5	0.0	10.8	4.7	11.3	Nil
7462.5	0.0	10.3	4.7	9.4	Nil
		Core No. 47 (7516-7557') - DUPEROW			
7516-20	0.0	5.1	11.3	22.6	Nil
7520-25	0.0	6.4	0.0	75.8	Nil
7525-30	0.0	5.5	8.4	21.0	Nil
7535-40	0.4	6.3	6.9	45.2	Nil
7540-45	0.0	2.4	46.3	46.3	Nil
7545-50	0.0	3.9	0.0	43.9	Nil
7550-57	0.0	2.5	18.6	55.8	Nil
		Core No. 49 (7599-7657') - DUPEROW			
7652.5	0.0	2.8	18.2	54.6	Nil
7653.5	0.0	3.2	15.4	62.4	Nil
		Core No. 50 (7659-7717) - DUPEROW			
7677.5	0.0	2.4	0.0	0.0	Nil
7682.5	0.0	3.8	0.0	36.1	Nil
7687.5	0.0	8.0	5.8	31.6	Nil
7692.5	0.7	9.4	0.0	9.5	Nil
7697.5	0.0	4.6	10.4	20.8	Nil
7702.5	0.0	5.4	0.0	16.6	Nil
7714.5	0.0	5.7	8.3	20.7	Nil
7716.5	0.0	3.4	12.7	0.0	Nil
		Core No. 56 (8010-8068') - DAWSON BAY			
8054.5	10.7	5.1	9.1	22.5	Oil
8059.5	0.0	2.4	0.0	37.9	Nil
		Core No. 62 (8336-8356') - SIL. INTERLAKE			
8336.5	0.0	5.4	0.0	36.1	Nil
8341.5	0.0	4.9	0.0	25.8	Nil
8345.6	0.0	6.1	0.0	39.3	Nil
8349.5	0.0	3.8	0.0	31.6	Nil

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	Core No. 63 (8356-8406') - SIL. INTERLAKE				
8360.5	0.0	3.3	0.0	21.8	Nil
8370.5	0.0	1.9	0.0	32.1	Nil
8380.5	0.0	0.0	0.0	0.0	Nil
8390.5	0.0	0.0	0.0	0.0	Nil
8400.5	0.0	0.0	0.0	0.0	Nil
	Core No. 64 (8406-8419') - SIL. INTERLAKE				
8409.5	0.0	3.2	0.0	22.5	Nil
8415.5	0.0	2.2	0.0	33.7	Nil
	Core No. 65 (8419-8477') - SIL. INTERLAKE				
8429.5	0.0	0.0	0.0	0.0	Nil
8429.5	0.0	0.0	0.0	0.0	Nil
8439.5	0.0	0.0	0.0	0.0	Nil
8449.5	0.0	0.0	0.0	0.0	Nil
8459.5	0.0	0.0	0.0	0.0	Nil
8469.5	0.0	0.0	0.0	0.0	Nil
8476.5	0.0	0.0	0.0	0.0	Nil
	Core No. 66 (8477-8535') - SIL. INTERLAKE				
8487.5	0.0	0.0	0.0	0.0	Nil
8497.5	0.0	0.0	0.0	0.0	Nil
8507.5	0.0	0.0	0.0	0.0	Nil
8517.5	0.0	3.9	0.0	38.5	Nil
8527.5	0.0	0.0	0.0	0.0	Nil
	Core No. 70 (8622-8680') - GRENTON				
8634.5	0.0	1.1	0.0	56.2	Nil
8643.5	0.0	1.3	0.0	0.0	Nil
8654.5	0.0	1.1	0.0	0.0	Nil
8659.5	0.0	1.2	0.0	53.4	Nil
	Core No. 72 (8666-8737') - ORD. RED RIVER				
8695.5	0.0	5.7	0.0	26.4	Nil
8700.5	0.0	4.6	0.0	25.5	Nil
8705.5	0.0	6.6	0.0	19.1	Nil
8710.5	0.0	7.3	0.0	17.3	Nil
8715.5	0.0	6.6	0.0	16.8	Nil
	Core No. 75 (8846-8873') - ORD. RED RIVER				
8847.5	0.0	7.1	0.0	26.8	Nil
8849.5	0.0	4.5	0.0	81.4	Nil
8851.5	3.9	3.0	0.0	100.0	Water

Core Analysis Report Continued

Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
		Core No. 75 - Continued			
8853.5	4.4	5.5	0.0	33.7	Water
8855.5	23.0	8.2	0.0	100.0	Water
8857.5	21.0	9.9	0.0	100.0	Water
		Core No. 79 (9047-9055') - ORD. RED RIVER			
9047.5	1.1	2.4	0.0	0.0	Nil
9049.5	0.0	3.6	0.0	0.0	Nil
9051.5	0.0	1.0	0.0	100.0	Nil
9053.5	0.0	1.9	0.0	43.7	Nil
		Core No. 84 (9102-9109') - WINNEPEG SAND			
9103.5	0.0	3.0	0.0	0.0	Nil
9105.5	0.0	0.0	0.0	0.0	Nil
9107.5	0.0	2.3	0.0	0.0	Nil
		Core No. 88 (9121-9127') - WINNEPEG SAND			
9122.5	0.9	1.7	0.0	0.0	Nil
9125.5	0.0	2.4	0.0	0.0	Nil
		Core No. 89 (9127-9137') - WINNEPEG SAND			
9127.5	0.0	1.3	0.0	45.7	Nil
9129.5	0.0	2.3	0.0	31.7	Nil
9131.5	0.0	1.7	0.0	0.0	Nil
9133.5	0.0	1.3	0.0	52.4	Nil
9135.5	0.0	1.5	0.0	0.0	Nil
		Core No. 91 (9146-9153') - WINNEPEG SAND			
9146-48	0.0	2.3	0.0	42.5	Nil
9148-50	0.0	1.8	0.0	80.0	Nil
9150-52	0.0	2.9	0.0	25.0	Nil
9152-54	0.0	3.3	0.0	0.0	Nil

539

THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL. Location _____ File _____

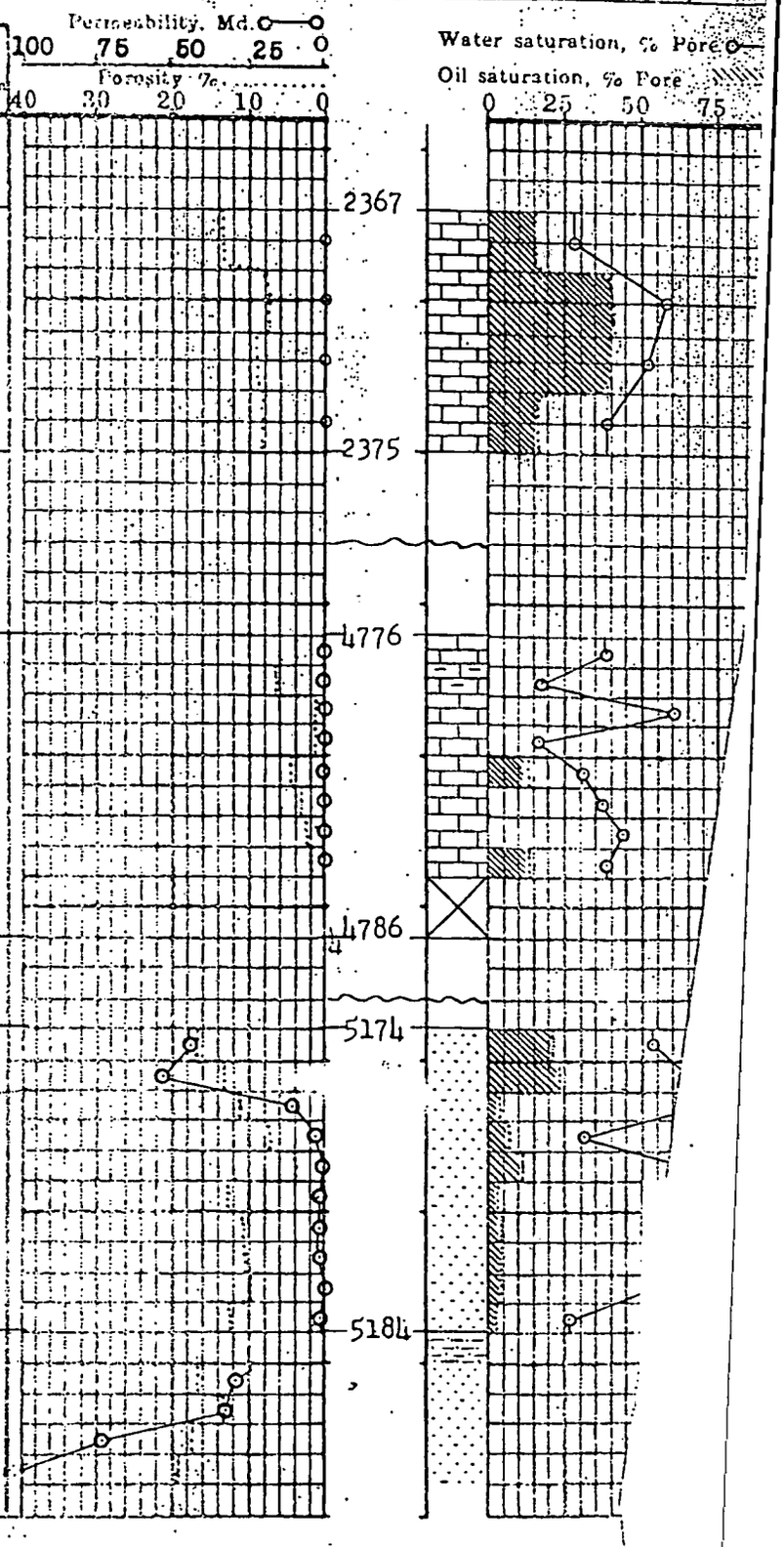
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field WILDCAT Shale _____ Unit _____

Lime _____ #4(5184-5223')

County ROOSEVELT State MONTANA Remarks CORE #1 (2367-2375')#2(4776-4786')#3)5174-5184'

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	2368	0.0	13.2	15.1	28.6	Nil
	2370	0.0	7.9	41.0	59.0	Nil
	2372	0.0	9.2	39.2	51.6	Nil
	2374	0.0	8.4	15.9	38.4	Nil
	4776.5	0.0	4.0	0.0	38.2	NIL
	4777.5	0.0	6.1	0.0	19.8	"
	4778.5	0.0	1.6	0.0	60.4	"
	4779.5	0.0	1.7	0.0	17.7	"
	4780.5	0.0	4.1	12.0	30.1	"
	4781.5	0.0	2.6	0.0	37.2	"
	4782.5	0.0	2.2	0.0	44.5	"
	4783.5	0.0	2.0	12.9	38.8	"
	5174.5	44.8	16.3	21.0	54.6	Oil
	5175.5	53.0	13.1	24.2	65.2	"
	5176.5	10.5	11.7	4.0	68.5	Water
	5177.5	3.6	7.7	5.7	31.6	"
	5178.5	0.0	4.0	11.3	67.8	Nil
	5179.5	.4	12.7	3.3	54.4	Water
	5180.5	.4	10.4	4.7	68.2	"
	5181.5	.1	10.3	4.7	87.0	Nil
	5182.5	0.0	10.0	4.7	54.0	"
	5183.5	.1	12.3	3.8	26.8	"
	5185.5	29.7	16.3	0.0	70.4	Water
	5186.5	33.4	13.3	0.0	55.2	"
	5187.5	72.0	17.9	0.0	87.8	"
	5188.5	129.0	13.8	0.0	87.6	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

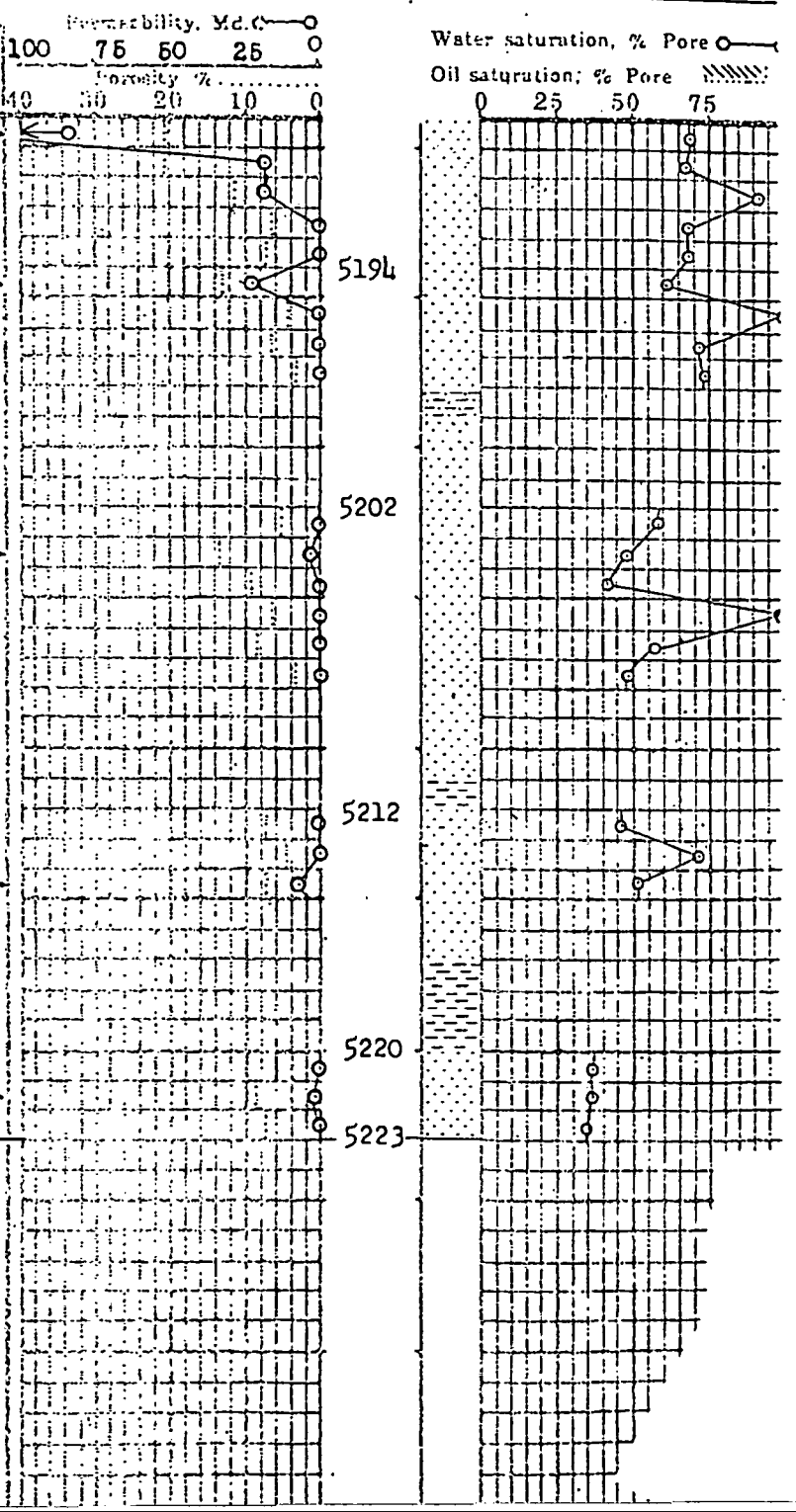
Company C. H. MURPHY JR. ET. AL. Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field WILDCAT Shale _____ Unit _____

County ROOSEVELT State MONTANA Remarks CORE # 4 (CONTINUED)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5189.5	143.0	20.3	0.0	69.7	Water
	5190.5	18.9	20.3	0.0	67.1	"
	5191.5	18.9	11.9	0.0	93.4	"
	5192.5	0.0	6.5	0.0	68.7	NIL
	5193.5	0.0	7.1	0.0	68.3	"
	5194.5	23.1	13.0	0.0	62.1	Water
	5195.5	0.0	5.0	0.0	100.0	NIL
	5196.5	0.0	6.6	0.0	72.3	"
	5197.5	0.0	3.4	0.0	74.2	"
	5202.5	0.0	5.1	0.0	58.2	NIL
	5203.5	4.4	13.8	0.0	47.2	Water
	5204.5	0.0	9.2	0.0	42.9	NIL
	5205.5	0.0	6.9	0.0	100.0	"
	5206.5	0.0	8.4	0.0	57.0	"
	5207.5	0.0	3.8	0.0	49.3	"
	5212.5	0.0	7.7	0.0	46.6	NIL
	5213.5	0.0	4.4	0.0	71.3	"
	5214.5	7.7	7.2	0.0	51.0	Water
	5220.5	0.0	6.0	0.0	36.3	NIL
	5221.5	1.4	8.8	0.0	36.6	Water
	5222.5	0.0	7.9	0.0	35.0	NIL



TH., HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL. Location _____ File _____

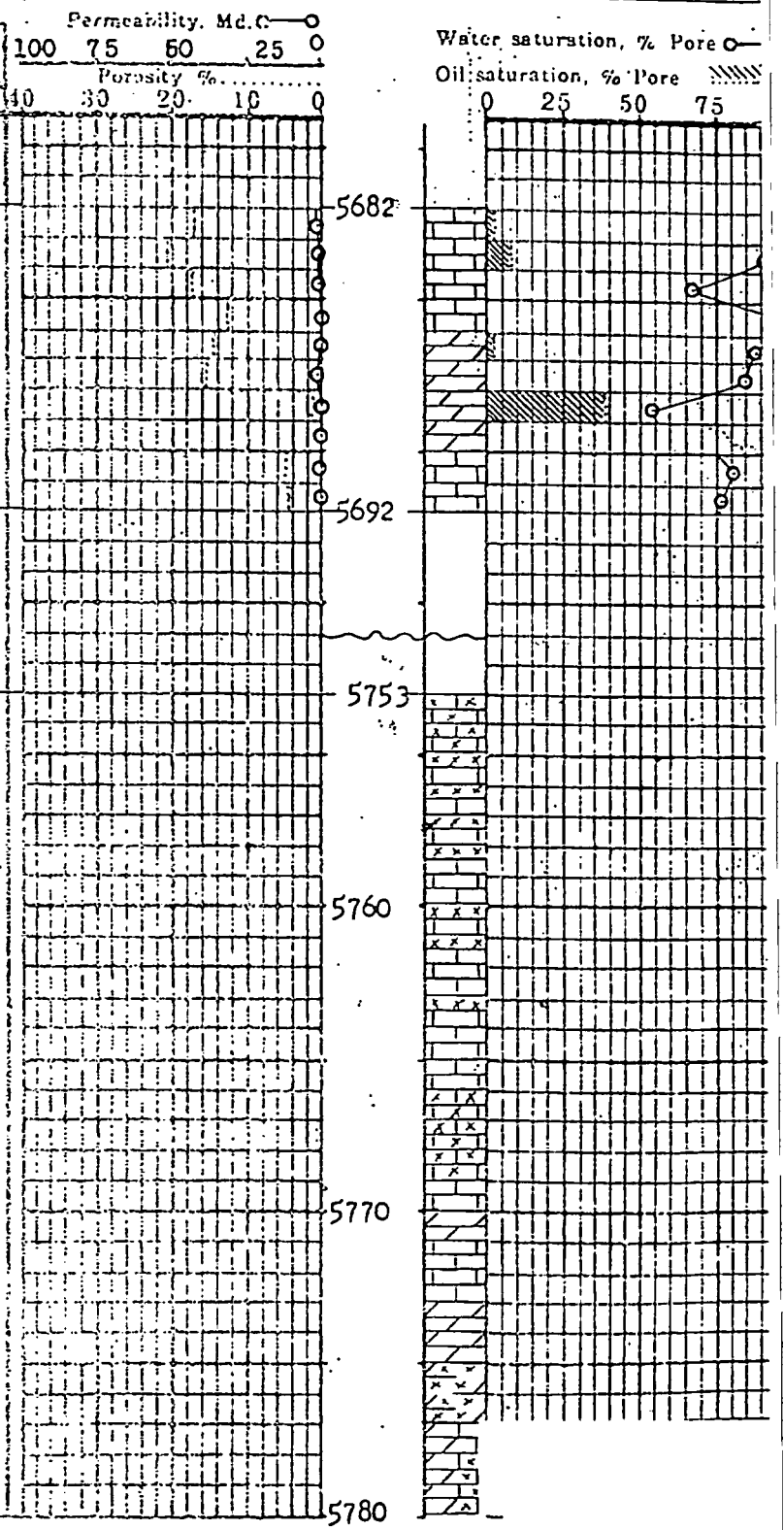
Well EAST POPLAR UNIT # 1 Legend: Sand ____ Dolomite ____ Eng. _____

Field WILDCAT Shale ____ Anhydrite ____ Unit _____

Lime ____ _____

County ROOSEVELT State MONTANA Remarks CORE # 5 (5682-5692') #7 (5753-5800')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5682.5	.5	17.4	2.5	97.5	Water
	5683.5	.1	20.3	7.7	92.1	Nil
	5684.5	.3	17.6	0.0	67.7	Water
	5685.5	0.0	12.8	0.0	100.0	NIL
	5686.5	0.0	11.4	3.1	88.1	"
	5687.5	.1	15.3	0.0	85.0	"
	5688.5	0.0	1.3	39.6	59.5	NIL
	5689.5	0.0	0.0	0.0	0.0	"
	5690.5	0.0	5.5	0.0	81.4	"
	5691.5	0.0	4.4	0.0	75.9	"



THI HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL. Location _____ File _____

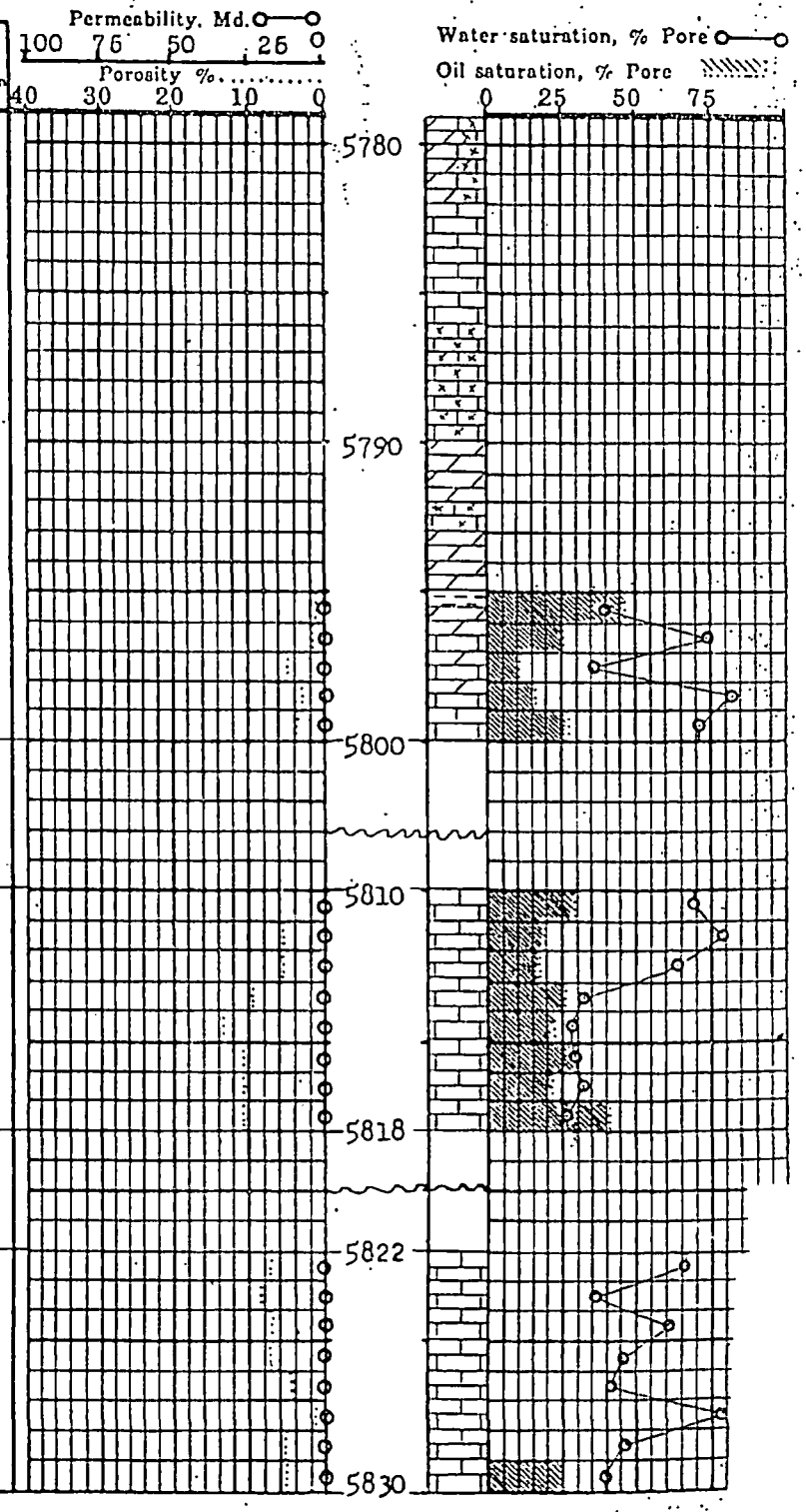
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

County _____ State _____ Lime..... _____

Remarks CORE #7 (Cont)#8 (5810-5818')#9 (5822-5830')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5795.5	0.0	1.1	47.6	40.5	Nil
	5796.5	0.0	1.8	25.2	74.8	"
	5797.5	0.0	4.8	10.2	35.8	"
	5798.5	0.0	3.0	16.4	83.7	"
	5799.5	0.0	3.5	28.6	71.4	"
		Perf'd				
	5810.5	0.0	8.0	29.5	69.5	Nil
	5811.5	0.0	5.5	19.9	79.4	"
	5812.5	0.0	5.8	18.8	64.0	"
	5813.5	0.0	9.3	26.1	33.3	"
	5814.5	0.0	13.3	23.0	27.9	"
	5815.5	0.0	10.6	29.5	29.5	"
	5816.5	0.0	10.6	22.6	32.0	"
	5817.5	0.0	10.6	40.3	26.9	"
	5822.5	0.0	7.0	0.0	65.3	Nil
	5823.5	0.0	8.6	0.0	35.9	"
	5824.5	0.0	7.2	0.0	60.8	"
	5825.5	0.0	7.1	0.0	45.6	"
	5826.5	0.0	4.4	0.0	43.0	"
	5827.5	0.0	1.2	0.0	79.2	"
	5828.5	0.0	5.1	0.0	47.3	"
	5829.5	0.0	4.8	25.0	40.0	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. FT. AL. Location _____ File _____

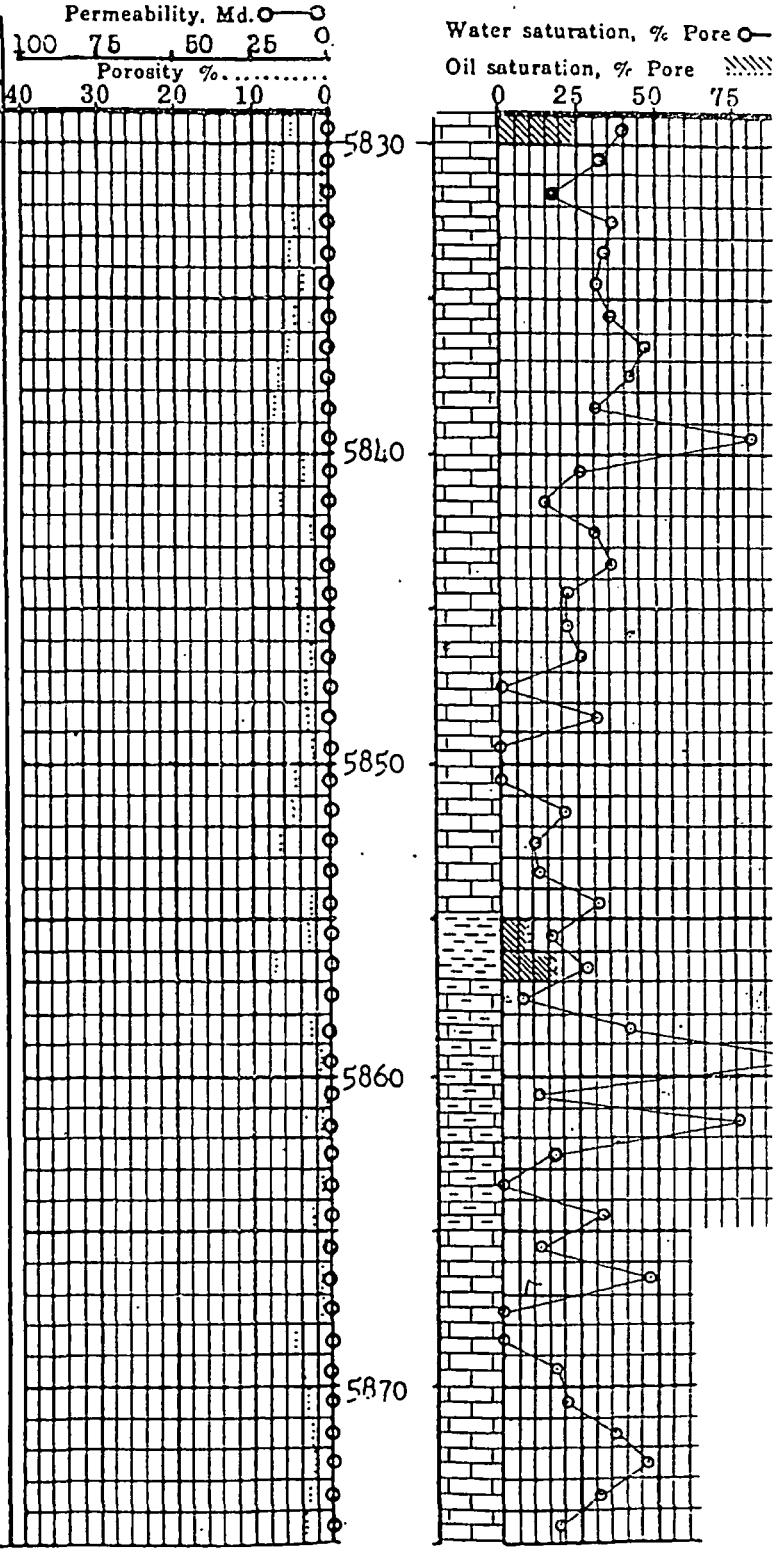
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

Field _____ Shale..... Unit _____

Lime.....

County _____ State _____ Remarks Core #9 (Cont) #10 (5830-5880')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5829.5	0.0	4.8	25.0	40.0	Nil
	5830.5	0.0	7.2	0.0	33.0	Nil
	5831.5	0.0	1.0	0.0	18.5	"
	5832.5	0.0	4.6	0.0	35.8	"
	5833.5	0.0	4.9	0.0	34.2	"
	5834.5	0.0	3.8	0.0	31.2	"
	5835.5	0.0	4.5	0.0	36.6	"
	5836.5	0.0	5.4	0.0	47.0	"
	5837.5	0.0	6.3	0.0	43.8	"
	5838.5	0.0	6.9	0.0	30.5	"
	5839.5	0.0	8.5	0.0	81.7	"
	5840.5	0.0	3.8	0.0	25.1	"
	5841.5	0.0	6.1	0.0	15.0	"
	5842.5	0.0	2.5	0.0	30.1	"
	5843.5	0.0	2.0	0.0	35.1	"
	5844.5	0.0	4.1	0.0	22.9	"
	5845.5	0.0	3.0	0.0	22.7	"
	5846.5	0.0	2.7	0.0	25.9	"
	5847.5	0.0	3.3	0.0	0.0	"
	5848.5	0.0	3.0	0.0	31.7	"
	5849.5	0.0	2.3	0.0	0.0	"
	5850.5	0.0	4.3	0.0	0.0	"
	5851.5	0.0	4.5	0.0	21.5	"
	5852.5	0.0	6.3	0.0	11.4	"
	5853.5	0.0	6.0	0.0	12.5	"
	5854.5	0.0	2.4	0.0	31.4	"
	5855.5	0.0	2.5	9.5	15.6	"
	5856.5	0.0	7.2	18.8	27.9	"
	5857.5	0.0	14.0	0.0	6.9	"
	5858.5	0.0	2.8	0.0	41.8	"
	5859.5	0.0	1.3	0.0	99.8	"
	5860.5	0.0	0.9	0.0	13.4	"
	5861.5	0.0	1.0	0.0	76.7	"
	5862.5	0.0	0.4	0.0	18.1	"
	5863.5	0.0	1.2	0.0	0.0	"
	5864.5	0.0	2.3	0.0	32.7	"
	5865.5	0.0	0.7	0.0	13.7	"
	5866.5	0.0	1.5	0.0	48.8	"
	5867.5	0.0	1.1	0.0	0.0	"
	5868.5	0.0	5.9	0.0	0.0	"
	5869.5	0.0	4.0	0.0	17.2	"
	5870.5	0.0	3.4	0.0	20.1	"
	5871.5	0.0	2.7	0.0	36.8	"
	5872.5	0.0	2.1	0.0	47.9	"
	5873.5	0.0	3.0	0.0	30.8	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

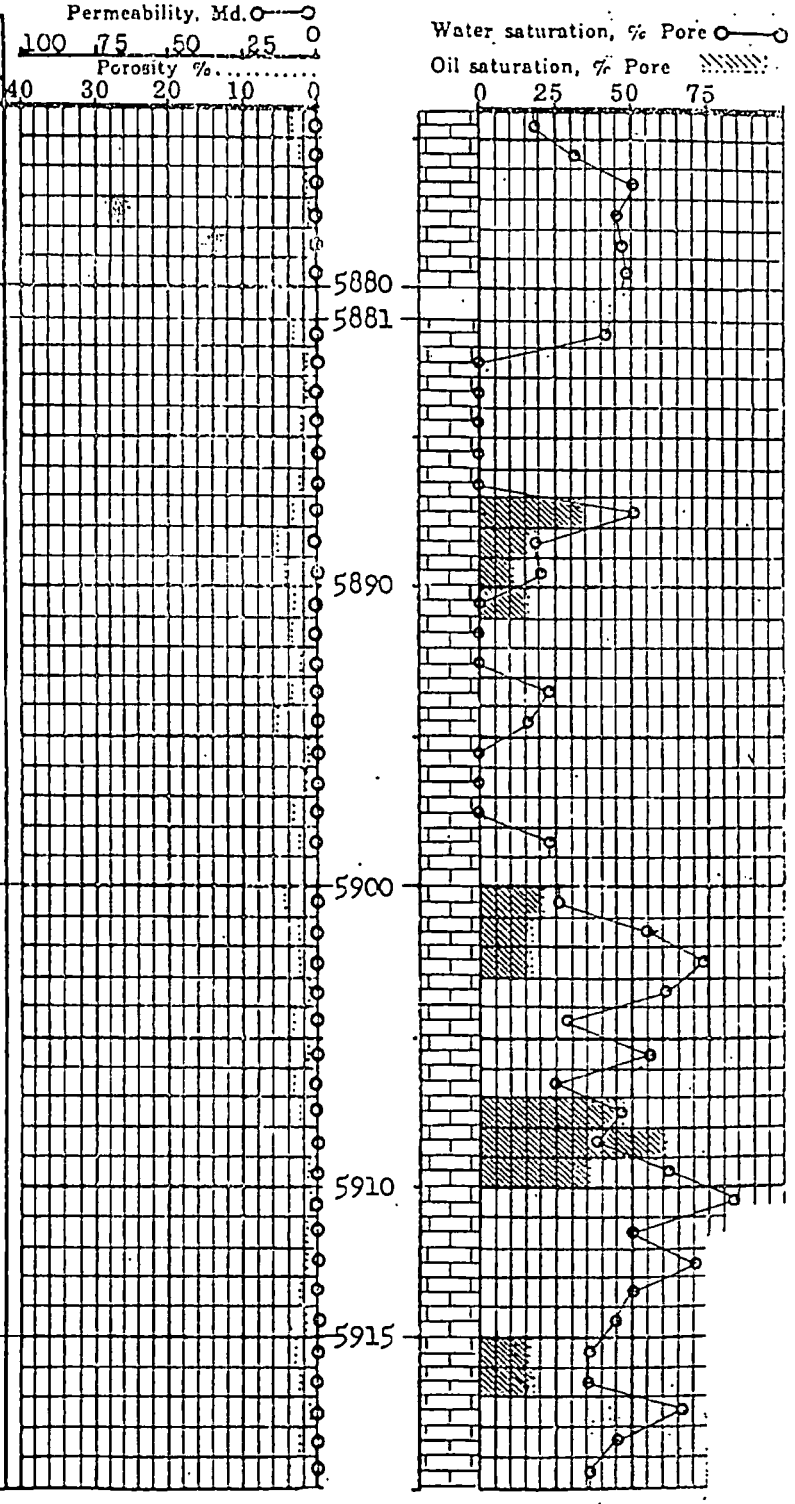
Company C? H. MURPHY JR. ET. AL. Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Shale..... Lime..... Eng. _____

Field _____ Unit _____

County _____ State _____ Remarks Core #10 (Cont) #11 (5881-5900') #13(5915-5926')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5874.5	0.0	3.6	0.0	19.4	Nil
	5875.5	0.0	2.5	0.0	33.3	"
	5876.5	0.0	1.9	0.0	50.5	"
	5877.5	0.0	1.5	0.0	46.9	"
	5878.5	0.0	2.0	0.0	48.6	"
	5879.5	0.0	2.0	0.0	49.7	"
	5881.5	0.0	3.3	0.0	42.0	Nil
	5882.5	0.0	1.8	0.0	0.0	"
	5883.5	0.0	1.8	0.0	0.0	"
	5884.5	0.0	2.1	0.0	0.0	"
	5885.5	0.0	0.0	0.0	0.0	"
	5886.5	0.0	2.5	0.0	0.0	"
	5887.5	0.0	3.8	34.5	51.8	"
	5888.5	0.0	5.5	19.8	19.8	"
	5889.5	0.0	4.2	10.7	21.4	"
	5890.5	0.0	3.0	15.7	0.0	"
	5891.5	0.0	3.7	0.0	0.0	"
	5892.5	0.0	2.2	0.0	0.0	"
	5893.5	0.0	3.7	0.0	24.5	"
	5894.5	0.0	5.7	0.0	16.4	"
	5895.5	0.0	1.5	0.0	0.0	"
	5896.5	0.0	1.9	0.0	0.0	"
	5897.5	0.0	3.7	0.0	0.0	"
	5898.5	0.0	2.9	0.0	24.2	"
	5900.5	0.0	4.7	21.9	26.3	Nil
	5901.5	0.0	2.6	18.3	55.0	"
	5902.5	0.0	2.5	18.4	74.0	"
	5903.5	0.0	1.5	0.0	62.6	"
	5904.5	0.0	3.2	0.0	29.4	"
	5905.5	0.0	1.7	0.0	56.5	"
	5906.5	0.0	3.6	0.0	25.0	"
	5907.5	0.0	2.3	48.5	48.5	"
	5908.5	0.0	2.0	60.5	39.5	"
	5909.5	0.0	1.2	36.0	63.0	"
	5910.5	0.0	1.1	0.0	84.7	"
	5911.5	0.0	1.3	0.0	50.0	"
	5912.5	0.0	1.6	0.0	70.6	"
	5913.5	0.0	2.2	0.0	51.0	"
	5914.5	0.0	1.9	0.0	41.3	"
	5915.5	0.0	3.0	15.3	38.4	Nil
	5916.5	0.0	2.4	18.5	36.9	"
	5917.5	0.0	1.3	0.0	68.2	"
	5918.5	0.0	2.3	0.0	46.7	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL. Location _____ File _____

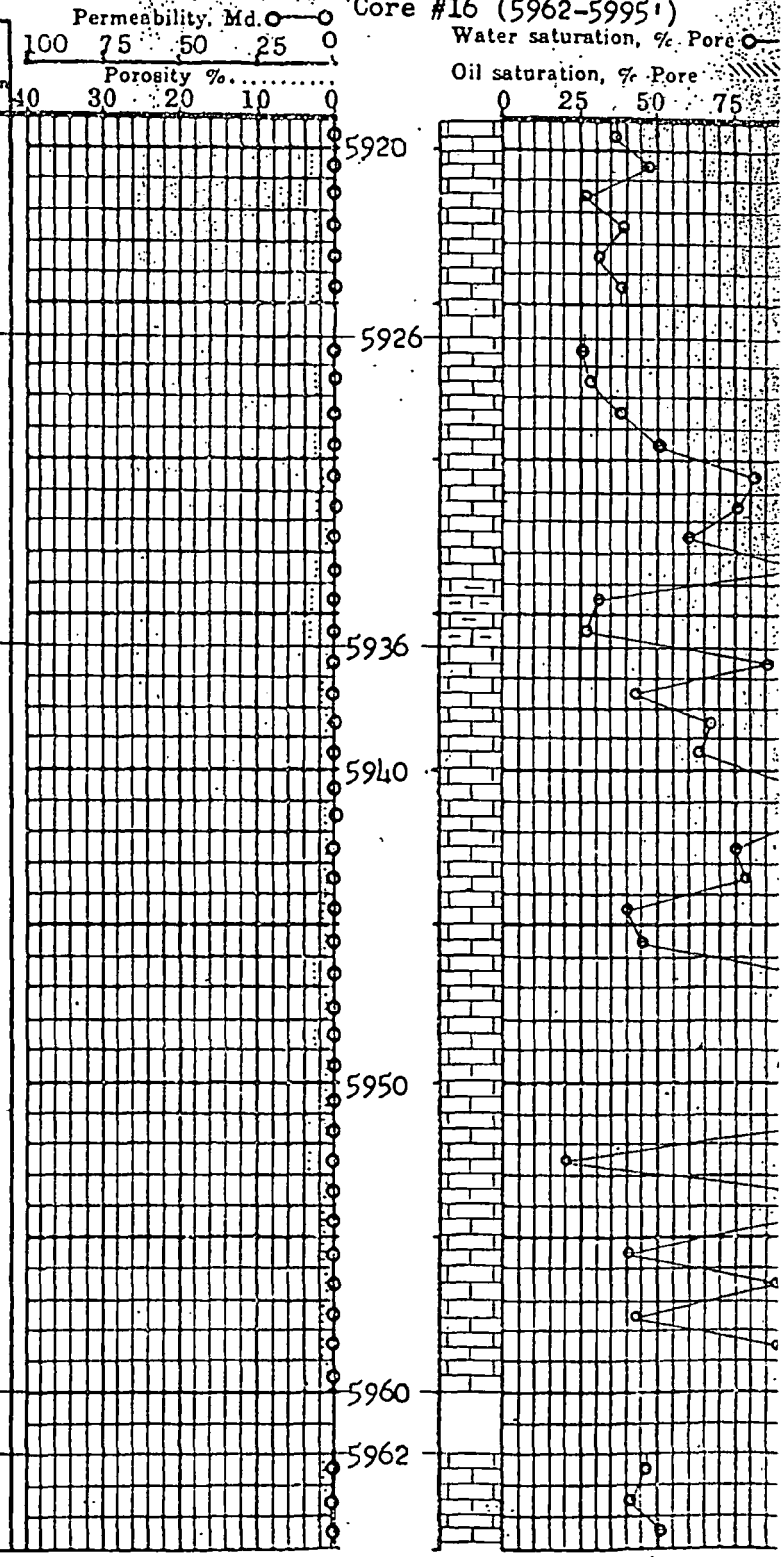
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____ Unit _____

County _____ State _____ Lime _____

Remarks Core # 13 (Cont) #14 (5926-36')#15(5936-60') Core #16 (5962-5995')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5919.5	0.0	4.0	0.0	38.6	Nil
	5920.5	0.0	3.3	0.0	48.6	"
	5921.5	0.0	4.9	0.0	26.6	"
	5922.5	0.0	2.3	0.0	38.9	"
	5923.5	0.0	2.8	0.0	31.9	"
	5924.5	0.0	2.3	0.0	39.8	"
	5926.5	0.0	2.0	0.0	26.9	Nil
	5927.5	0.0	2.4	0.0	29.5	"
	5928.5	0.0	2.0	0.0	39.3	"
	5929.5	0.0	2.3	0.0	50.5	"
	5930.5	0.0	1.7	0.0	82.7	"
	5931.5	0.0	2.3	0.0	76.8	"
	5932.5	0.0	1.1	0.0	61.5	"
	5933.5	0.0	2.2	0.0	97.0	"
	5934.5	0.0	2.8	0.0	30.2	"
	5935.5	0.0	2.9	0.0	28.3	"
	5936.5	0.0	1.0	0.0	86.0	Nil
	5937.5	0.0	1.7	0.0	44.0	"
	5938.5	0.0	1.1	0.0	68.2	"
	5939.5	0.0	2.0	0.0	64.0	"
	5940.5	0.0	2.0	0.0	97.0	"
	5941.5	0.0	1.6	0.0	95.5	"
	5942.5	0.0	1.0	0.0	75.5	"
	5943.5	0.0	1.1	0.0	79.6	"
	5944.5	0.0	1.8	0.0	41.7	"
	5945.5	0.0	1.6	0.0	46.7	"
	5946.5	0.0	2.6	0.0	97.0	"
	5947.5	0.0	1.2	0.0	93.4	"
	5948.5	0.0	2.7	0.0	97.8	"
	5949.5	0.0	1.1	0.0	91.5	"
	5950.5	0.0	1.0	0.0	98.5	"
	5951.5	0.0	1.0	0.0	91.0	"
	5952.5	0.0	3.7	0.0	21.9	"
	5953.5	0.0	1.0	0.0	91.9	"
	5954.5	0.0	1.2	0.0	53.6	"
	5955.5	0.0	1.8	0.0	41.3	"
	5956.5	0.0	1.0	0.0	89.9	"
	5957.5	0.0	1.7	0.0	44.9	"
	5958.5	0.0	1.9	0.0	89.9	"
	5959.5	0.0	0.8	0.0	95.0	"
	5962.5	0.0	1.7	0.0	47.5	Nil
	5963.5	0.0	14	0.0	42.0	"



Th HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL. Location _____ File _____

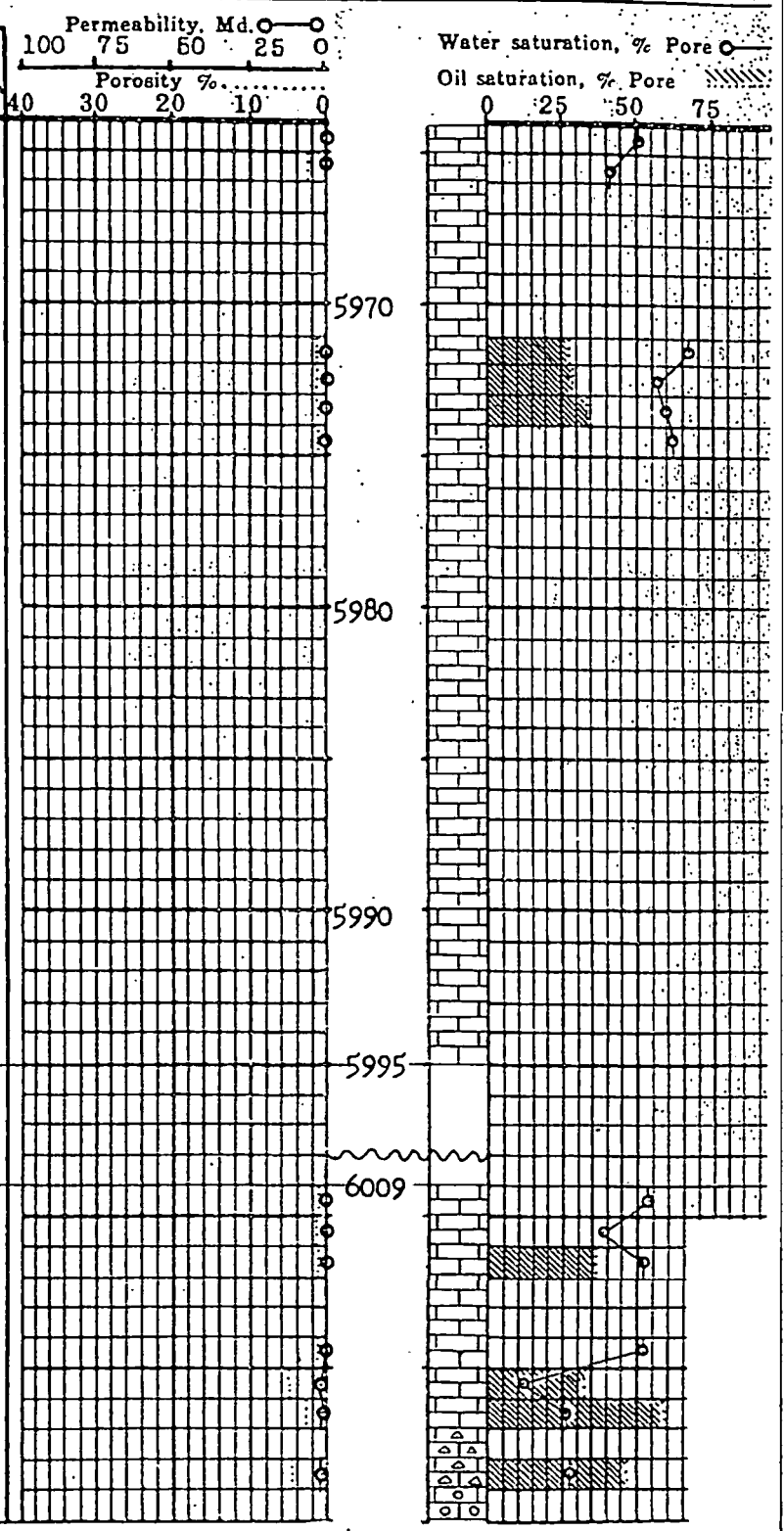
Well EAST POPLAR UNIT # 1 Legend: Sand ..... Chart ..... Eng. _____

Field _____ Shale ..... Quartz ..... Unit _____

County _____ State _____ Lime ..... _____

Remarks Core #16 (Cont) #18 (6009-6034')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	5964.5	0.0	2.0	0.0	50.6	Nil
	5965.5	0.0	2.3	0.0	42.6	"
	5971.5	0.0	1.6	28.5	67.2	Nil
	5972.5	0.0	1.5	29.1	58.2	"
	5973.5	0.0	1.3	34.0	60.0	"
	5974.5	0.0	1.2	0.0	63.0	"
	6009.5	0.0	1.1	0.0	54.2	Nil
	6010.5	0.0	1.5	0.0	39.8	"
	6011.5	0.0	1.3	35.1	52.6	"
	6014.5	0.0	1.1	0.0	52.3	Nil
	6015.5	1.9	5.1	33.6	12.7	Oil
	6016.5	0.1	2.5	59.5	25.4	"
	6018.5	1.7	4.3	47.5	28.4	Oil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

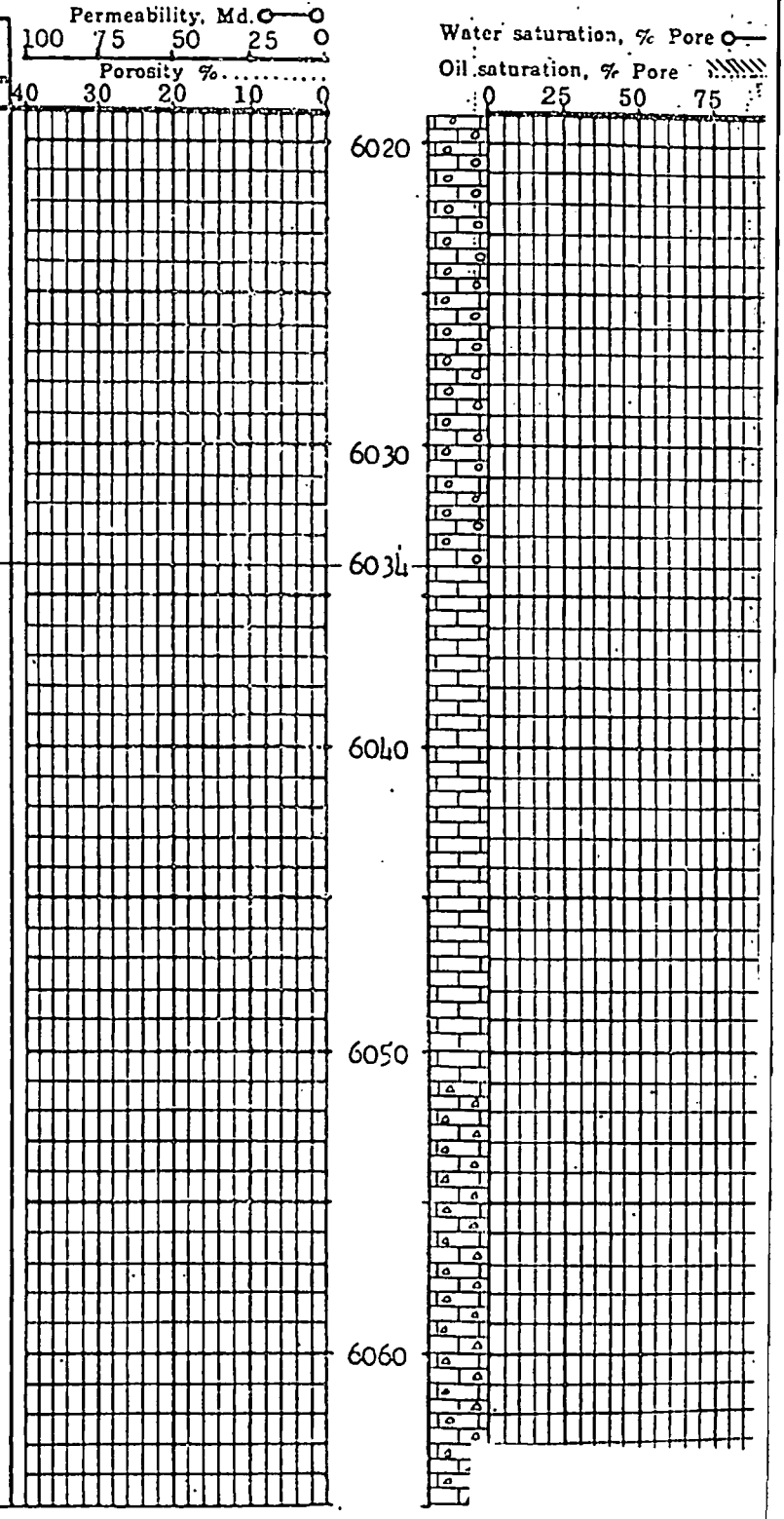
Well EAST POPLAR UNIT # 1 Legend: Sand..... Chert..... Eng. _____

Field _____ Shale..... Quartz..... Unit _____

County _____ State _____ Lime.....

Remarks Core #18 (Cont.) #19 (6034-6090')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. B. MURPHY JR. ET. AL. Location _____ File _____

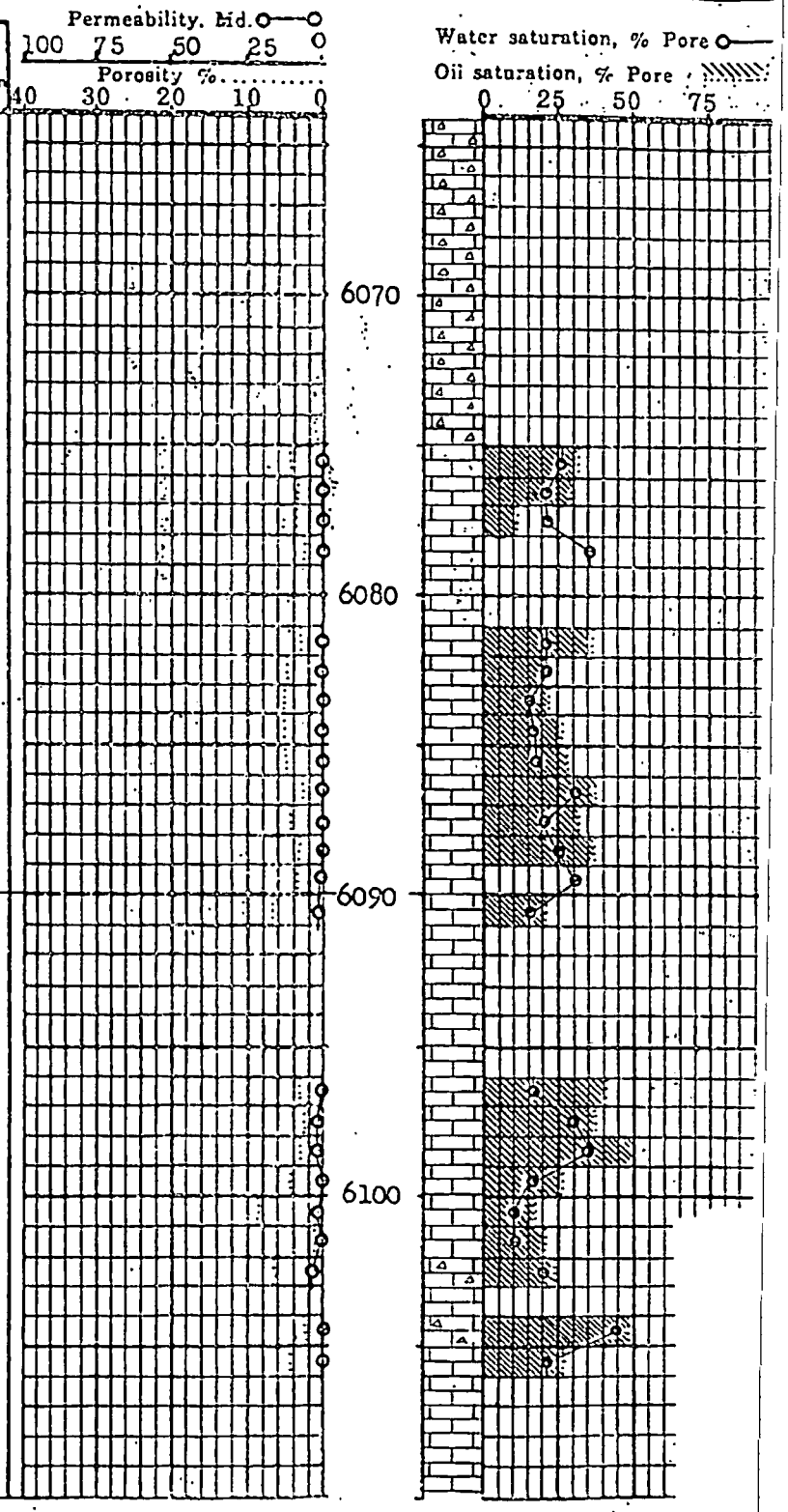
Well EAST POPLAR UNIT #1 Legend: Sand..... Chert..... Eng. _____

Field _____ Shale..... _____ Unit _____

Lime.....

County _____ State _____ Remarks Core #19 (Cont) #20 (6090-6145')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6075.5	0.0	4.2	32.4	25.9	Nil
	6076.5	0.0	3.8	28.4	22.7	"
	6077.5	0.0	3.9	11.9	23.8	"
	6078.5	0.0	2.3	0.0	36.4	"
	6081.5	0.0	3.0	37.6	22.5	Nil
	6082.5	0.0	4.6	21.8	23.2	"
	6083.5	0.0	4.8	23.1	15.4	"
	6084.5	0.0	5.0	25.6	17.1	"
	6085.5	0.0	4.9	28.4	18.9	"
	6086.5	0.0	3.6	38.6	32.2	"
	6087.5	0.0	4.2	32.2	21.4	"
	6088.5	0.0	3.6	38.5	25.7	"
	6089.5	0.0	3.7	0.0	30.2	"
	6090.5	1.8	6.4	21.8	15.6	Oil
	6096.5	0.0	3.5	40.8	18.8	Nil
	6097.5	0.1	2.7	37.5	30.0	Oil
	6098.5	0.2	2.9	50.0	35.0	"
	6099.5	0.0	4.2	26.6	17.9	Nil
	6100.5	0.1	8.3	18.3	10.5	Oil
	6101.5	0.0	1.0	21.2	11.8	Nil
	6102.5	2.4	6.1	24.2	22.3	Oil
	6104.5	0.0	2.4	49.5	45.0	Nil
	6105.5	0.0	4.1	25.2	23.0	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

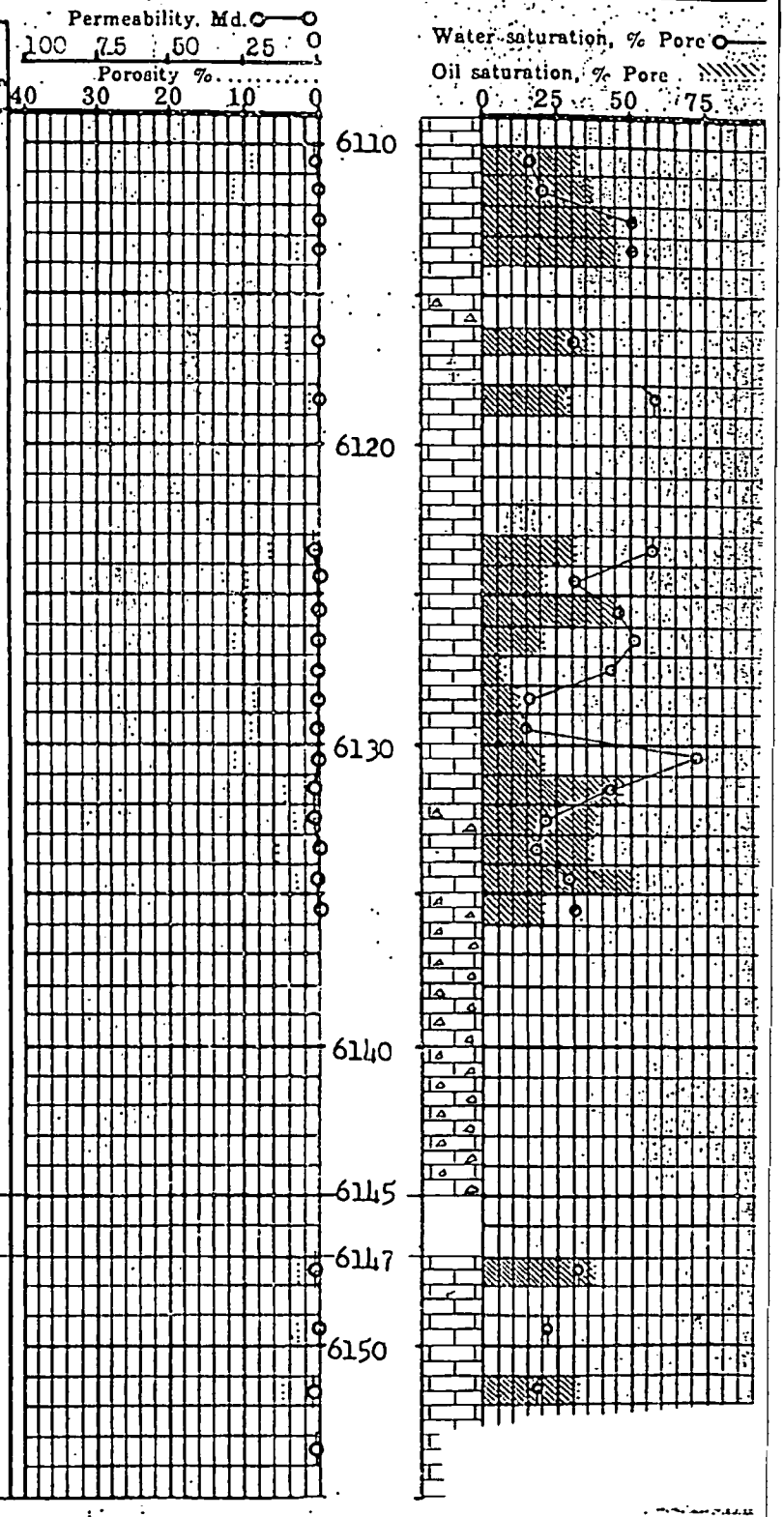
Well EAST POPLAR UNIT # 1 Legend: Sand..... Chert..... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core #20 (Cont) # 21 (6147-6203')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6110.5	0.1	9.0	33.0	17.8	Oil
	6111.5	0.0	11.5	37.6	20.7	Nil
	6112.5	0.0	8.0	44.7	50.3	"
	6113.5	0.0	3.1	46.6	50.2	"
	6116.5	0.0	4.2	37.8	30.4	Nil
	6118.5	0.0	1.6	29.6	59.2	Nil
	6123.5	1.9	6.3	31.7	57.2	Oil
	6124.5	0.0	9.7	23.4	30.6	Nil
	6125.5	0.0	9.9	47.3	47.3	"
	6126.5	0.0	11.2	21.3	50.2	"
	6127.5	0.0	16.0	8.4	44.7	"
	6128.5	0.0	8.7	13.5	15.8	"
	6129.5	0.0	9.0	14.2	14.2	"
	6130.5	0.0	11.3	20.6	72.1	"
	6131.5	Trace	4.6	47.2	44.8	Oil
	6132.5	Trace	3.4	39.2	22.8	"
	6133.5	0.0	5.6	38.5	19.3	Nil
	6134.5	0.0	3.2	52.0	29.3	"
	6135.5	0.0	2.0	20.3	30.4	"
	6147.5	0.1	2.9	38.1	30.5	Oil
	6149.5	0.0	2.9	0.0	22.9	Nil
	6151.5	0.2	4.7	31.4	19.5	"
	6153.5	0.1	5.1	39.1	22.2	"



Murphy Corporation :

Sir :

The following are field calculations of the pressure surveys on EPU wells #1, #3, #4. These values were obtained using the bomb calibration obtained prior to leaving Casper, and therefore may vary a few (±5 max.) pounds either way when final report is mailed.

I have no explanation for the apparent increase of B.H.P. on unit #1, over the value obtained last April.

EPU No.	Depth.	Pressure	Data
1	5799	3000 psi	Calculated
	at 5700	2754	measured
3	5599	2836	measured
4	5724	2896	measured
5	5796	2977	measured

THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

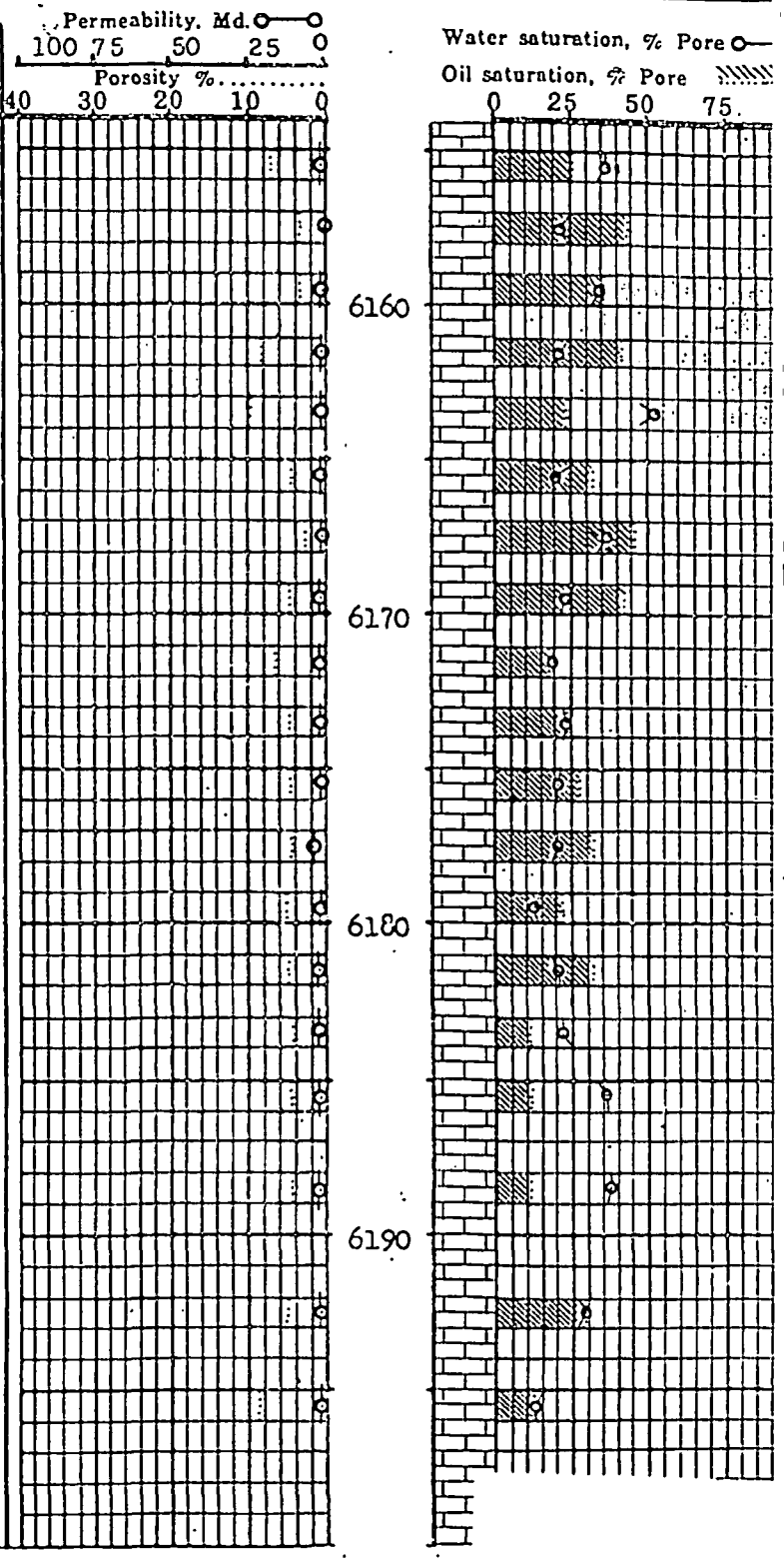
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

Field _____ Shale..... Unit _____

County _____ State _____ Lime.....

Remarks Core # 21 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
	6155.5	0.1	7.1	25.1	37.3	Nil
	6157.5	0.0	3.8	44.5	22.2	"
	6159.5	0.4	3.8	35.1	35.1	Oil
	6161.5	0.3	8.1	22.6	42.3	"
	6163.5	1.0	9.9	24.3	53.1	"
	6165.5	0.3	4.2	32.7	21.8	"
	6167.5	Trace	2.7	46.3	37.9	"
	6169.5	0.1	4.4	43.9	24.3	"
	6171.5	0.1	6.5	18.4	19.0	"
	6173.5	0.2	4.7	24.0	24.0	"
	6175.5	0.9	4.6	28.4	21.3	"
	6177.5	4.0	4.6	32.7	20.1	"
	6179.5	0.4	5.6	23.6	13.8	"
	6181.5	1.1	4.7	32.4	20.8	"
	6183.5	0.3	4.1	11.0	22.0	"
	6185.5	0.3	4.4	10.5	36.7	"
	6188.5	0.6	4.1	10.9	38.2	"
	6192.5	0.6	4.8	29.9	29.9	"
	6195.5	0.6	8.5	13.3	13.3	"



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. F. MURPHY JR. ET. AL. Location _____ File _____

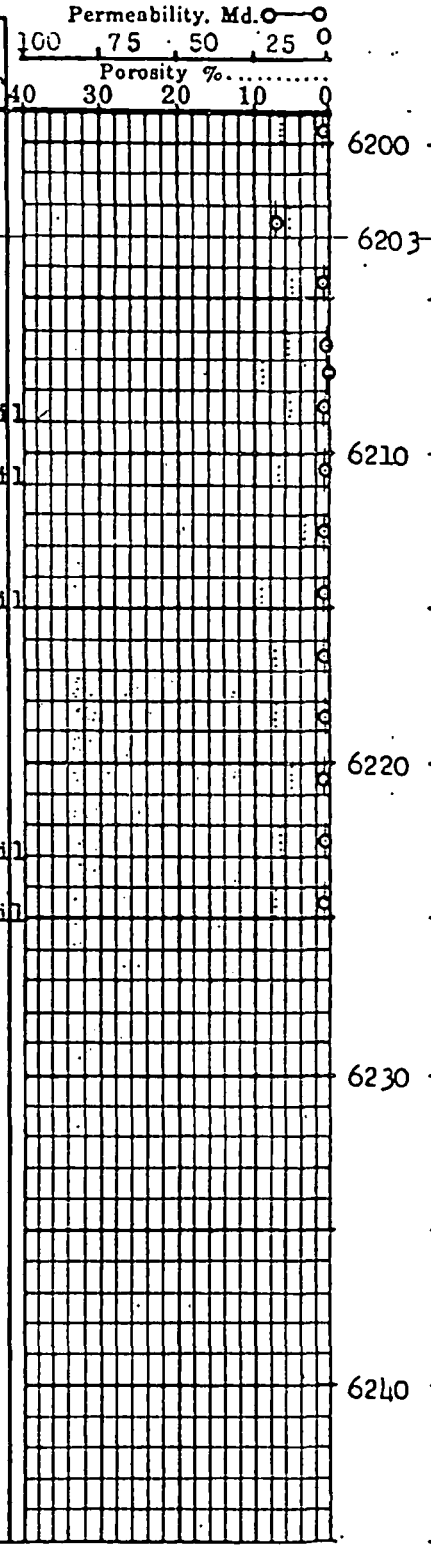
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

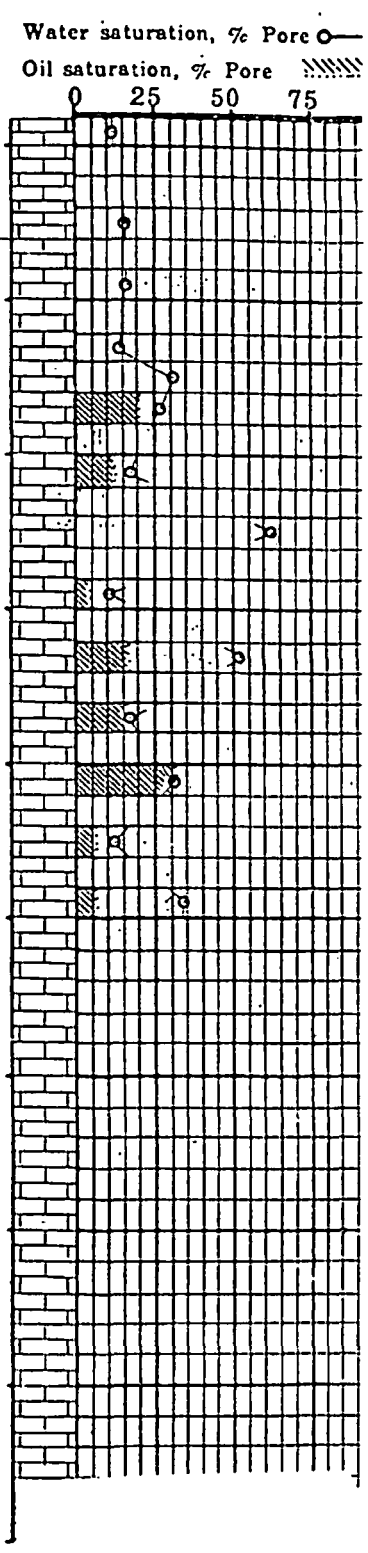
Field _____ Shale..... Unit _____

County _____ State _____ Lime.....

Remarks Core # 21 (Cont) # 22 (6203-6258')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6199.5	0.8	6.1	0.0	12.6	Gas
	6202.5	17.3	5.4	0.0	15.6	Gas
	6204.5	1.9	5.0	0.0	16.6	Gas
	6206.5	0.4	5.8	0.0	14.3	Gas
	6207.5	0.0	8.9	0.0	30.4	Nil
	6208.5	0.4	5.6	20.6	27.5	Gas-Oil
	6210.5	0.3	6.9	13.5	18.9	Gas-Oil
	6212.5	0.9	3.5	0.0	63.0	Gas
	6214.5	0.3	9.0	4.5	11.3	Gas-Oil
	6216.5	0.9	7.3	18.4	52.2	Oil
	6218.5	0.6	7.7	16.8	16.8	Oil
	6220.5	1.2	5.6	31.2	31.2	Oil
	6222.5	0.5	6.4	6.6	13.2	Gas-Oil
	6224.5	1.0	7.7	5.7	34.2	Gas-Oil





THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

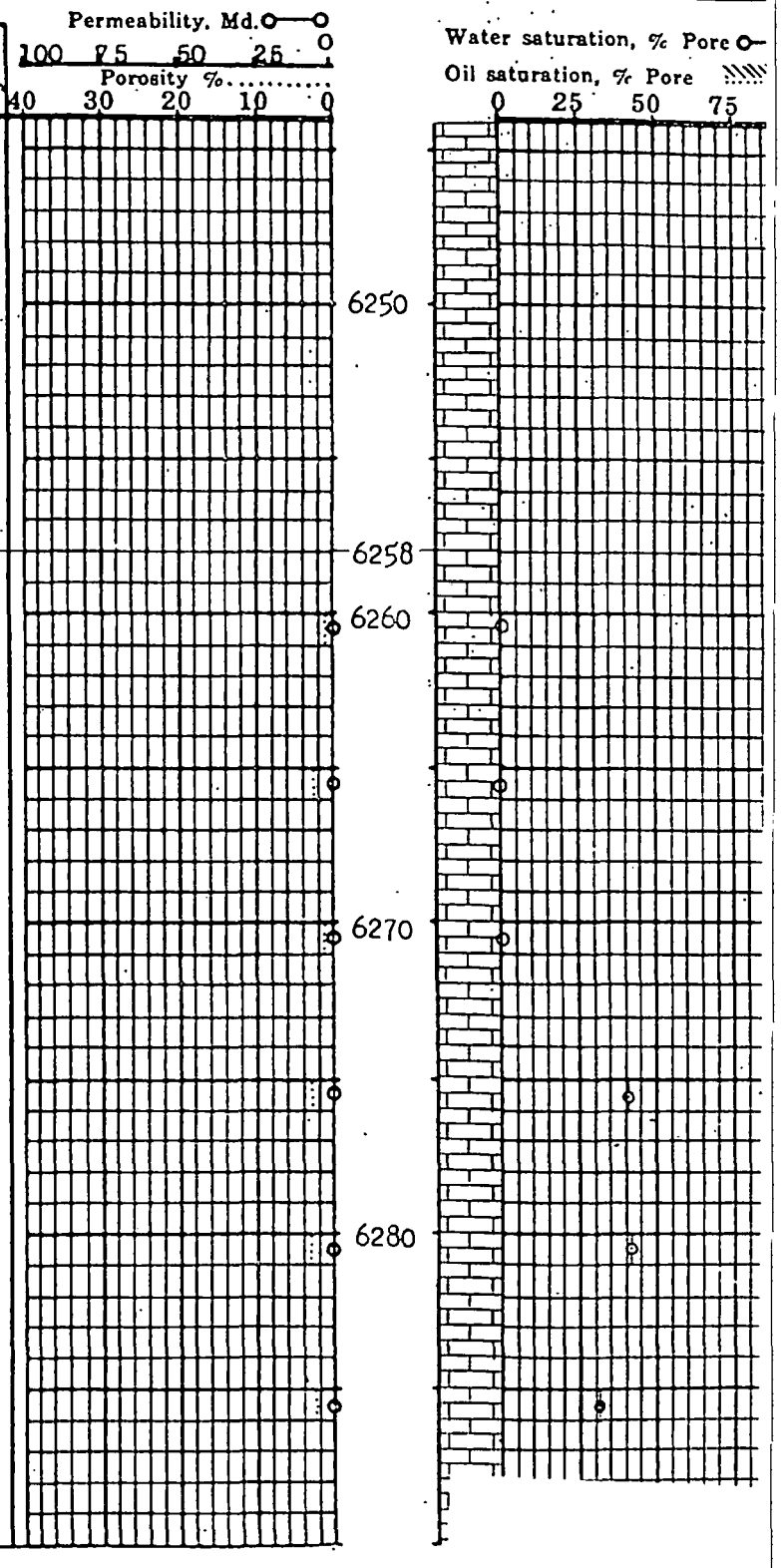
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

Field _____ Shale..... Unit _____

Lime.....

County _____ State _____ Remarks Core # 22 (Cont) # 23 (6258-6314')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
	6260.5	0.0	1.1	0.0	0.0	Nil
	6265.5	0.0	2.4	0.0	0.0	Nil
	6270.5	0.0	1.2	0.0	0.0	Nil
	6275.5	0.0	2.9	0.0	40.1	Nil
	6280.5	0.0	3.0	0.0	40.3	Nil
	6285.5	0.0	2.3	0.0	30.4	Nil



TH HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

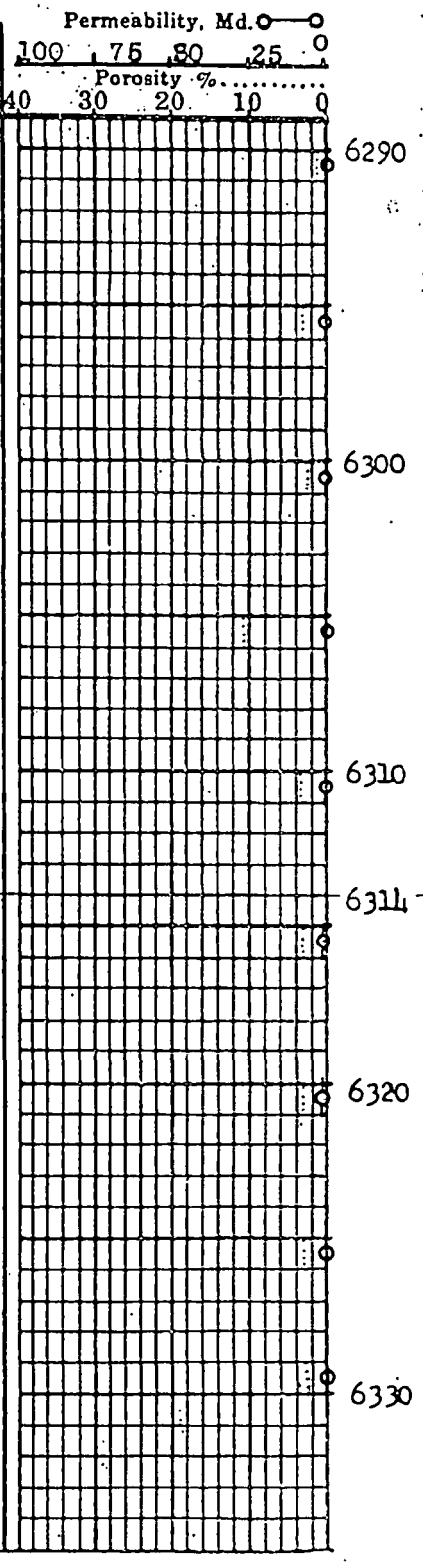
Well EAST POPLAR UNIT # 1 Legend: Sand ..... Chert ..... Eng. _____

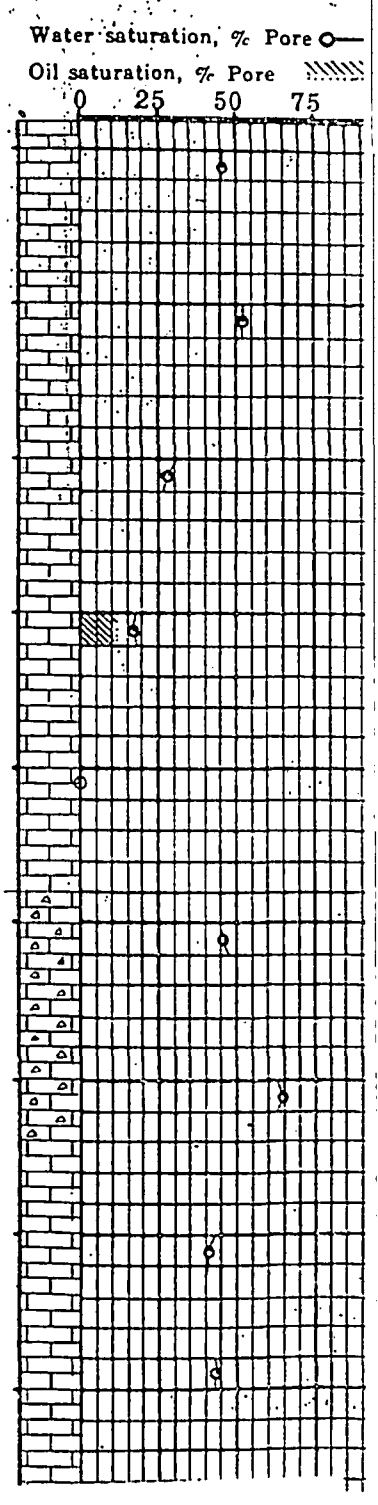
Field _____ Shale ..... _____ Unit _____

County _____ State _____ Lime ..... _____

Remarks Core # 23 (Cont) # 24 (6314-6372')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6290.5	0.0	1.5	0.0	46.2	Nil
	6295.5	0.0	3.3	0.0	53.4	Nil
	6300.5	0.0	2.3	0.0	28.9	Nil
	6305.5	0.0	10.5	12.4	18.7	Nil
	6310.5	0.0	3.6	0.0	0.0	Nil
	6316.5	0.7	3.1	0.0	46.1	Nil
	6320.5	Trace	3.2	0.0	65.0	Nil
	6325.5	0.0	2.3	0.0	41.3	Nil
	6229.5	0.0	2.2	0.0	44.3	Nil





THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

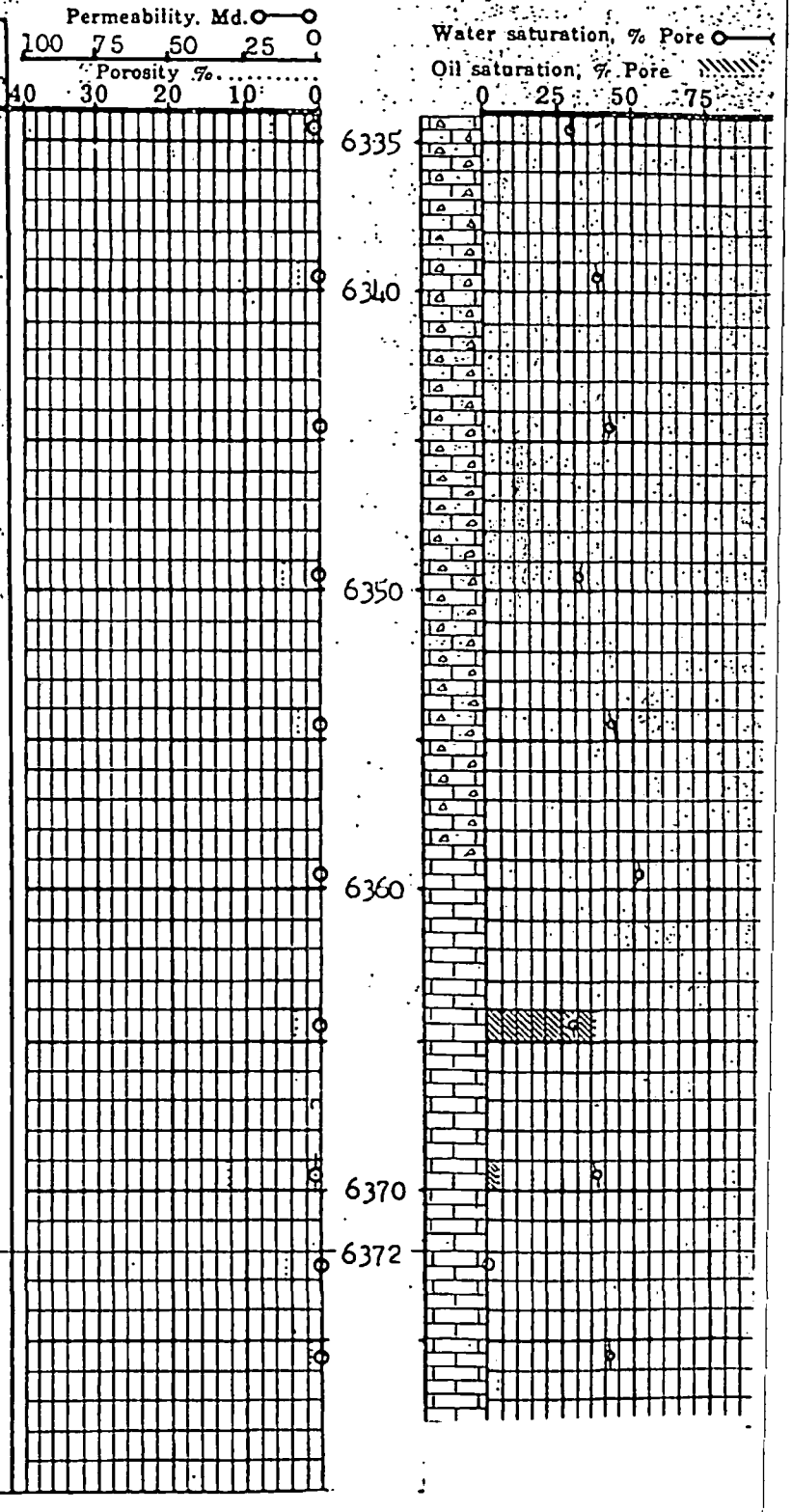
Well EAST POPLAR UNIT # 1 Legend: Sand ..... Chert ..... Eng. _____

Ficld _____ Shale ..... _____ Unit _____

County _____ State _____ Lime ..... _____

Remarks Core # 24 (Cont) # 25 (6372-6430')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6334.5	0.6	6.5	0.0	29.0	Nil
	6339.5	0.0	2.8	0.0	38.5	Nil
	6344.5	0.0	2.0	0.0	48.0	Nil
	6349.5	0.0	5.2	0.0	32.2	Nil
	6354.5	0.0	3.1	0.0	44.7	Nil
	6359.5	0.0	2.0	0.0	52.6	Nil
	6364.5	0.0	3.8	29.8	35.7	Nil
	6369.5	Trace	12.6	3.8	37.8	Nil
	6372.5	0.0	4.4	0.0	0.0	Nil
	6375.5	0.0	1.9	0.0	42.5	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET. AL Location _____ File _____

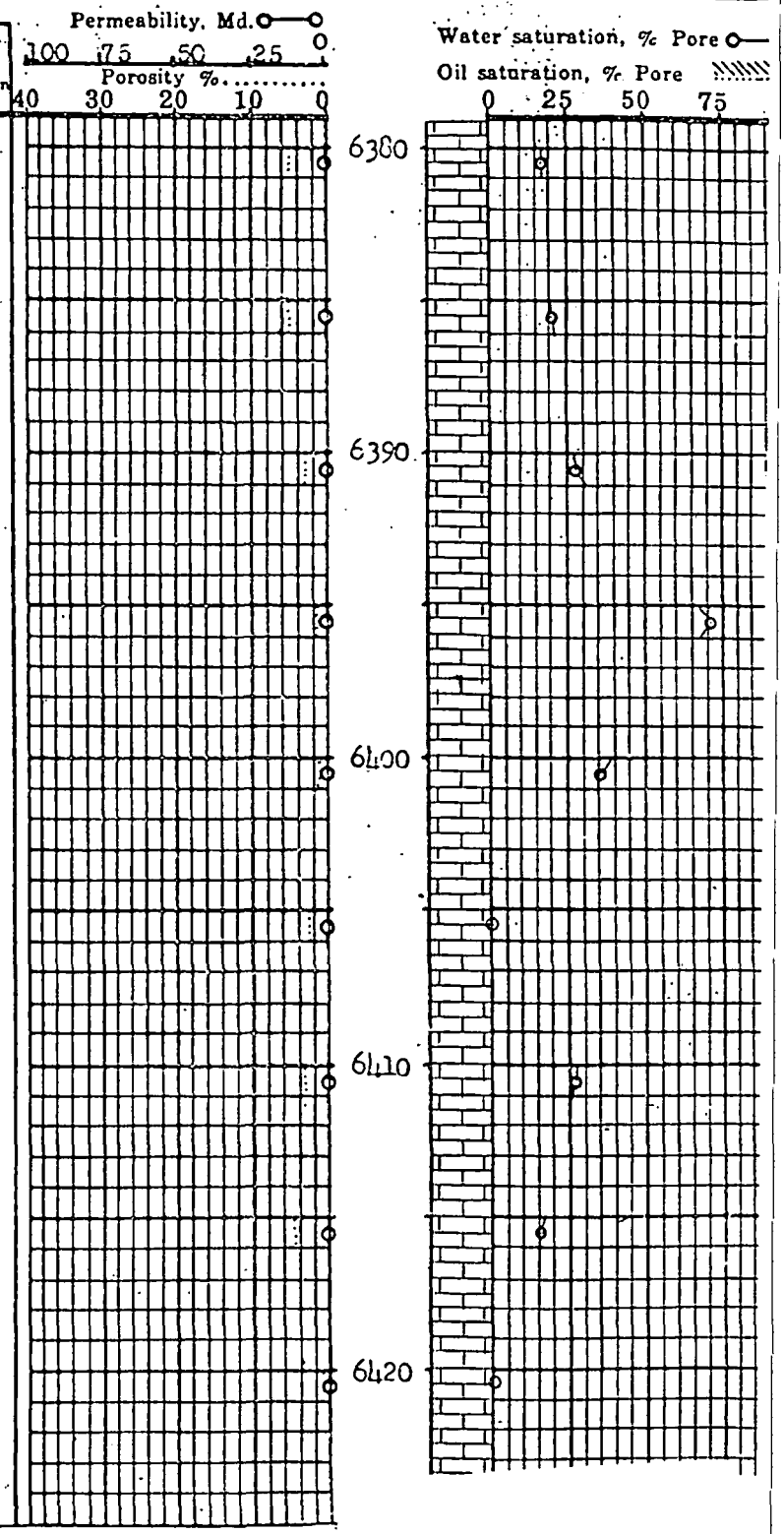
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____ Unit _____

Lime _____

County _____ State _____ Remarks Core # 25 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6380.5	0.0	5.0	0.0	18.0	Nil
	6385.5	0.0	4.5	0.0	20.4	Nil
	6390.5	0.0	3.3	0.0	27.0	Nil
	6395.5	0.0	1.9	0.0	70.2	Nil
	6400.5	0.0	1.6	0.0	35.9	Nil
	6405.5	0.0	2.2	0.0	0.0	Nil
	6410.5	0.0	3.2	0.0	27.8	Nil
	6415.5	0.0	4.5	0.0	15.8	Nil
	6420.5	0.0	0.9	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. FT. AL Location _____ File _____

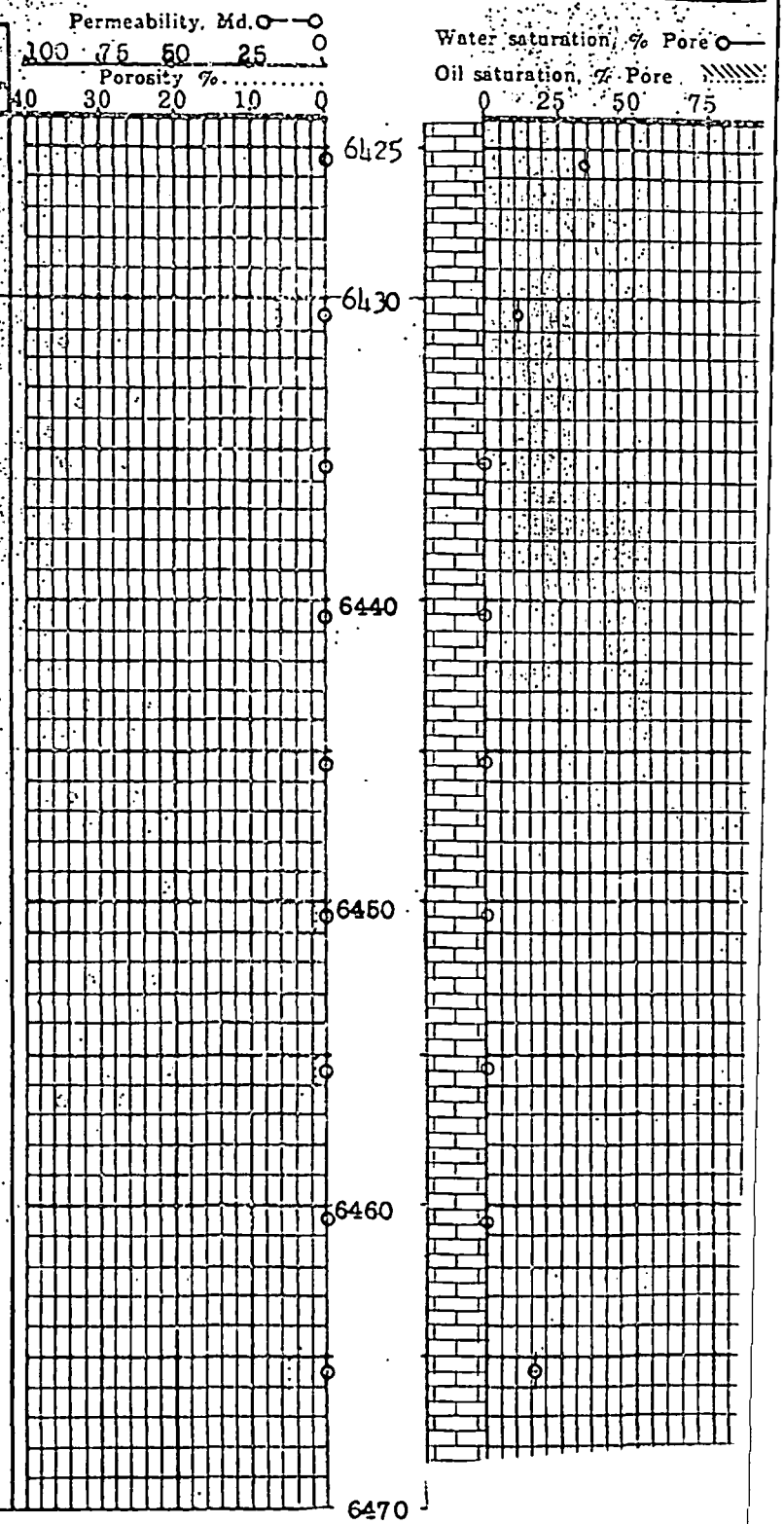
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____ Unit _____

County _____ State _____ Lime _____

Remarks Core # 25 (Cont) #26(6430-6488')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6425.5	0.0	2.0	0.0	34.6	Nil
	6430.5	0.0	6.5	0.0	10.1	Nil
	6435.5	0.0	0.0	0.0	0.0	Nil
	6440.5	0.0	0.0	0.0	0.0	Nil
	6445.5	0.0	0.0	0.0	0.0	Nil
	6450.5	0.0	1.3	0.0	0.0	Nil
	6455.5	0.0	1.3	0.0	0.0	Nil
	6460.5	0.0	0.0	0.0	0.0	Nil
	6466.5	0.0	5.0	0.0	16.9	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

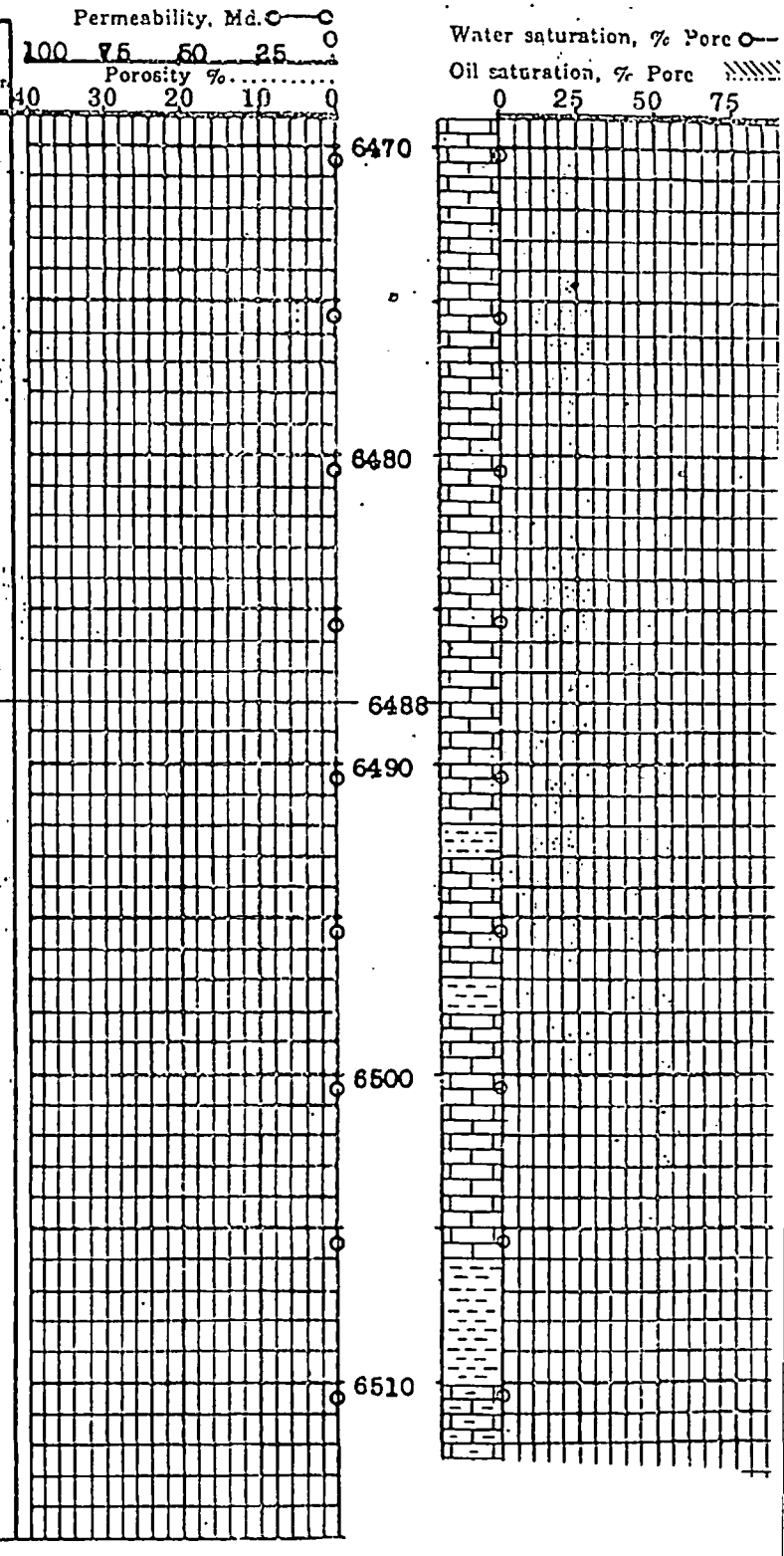
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____ Unit _____

Lime _____

County _____ State _____ Remarks Core #26 (Cont) # 27 (6488-6528')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6470.5	0.0	0.0	0.0	0.0	Nil
	6475.5	0.0	4.5	0.0	0.0	Nil
	6480.5	0.0	0.0	0.0	0.0	Nil
	6485.5	0.0	0.0	0.0	0.0	Nil
	6490.5	0.0	0.0	0.0	0.0	Nil
	6495.5	0.0	0.0	0.0	0.0	Nil
	6500.5	0.0	0.0	0.0	0.0	Nil
	6505.5	0.0	0.0	0.0	0.0	Nil
	6510.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL. Location _____ File _____

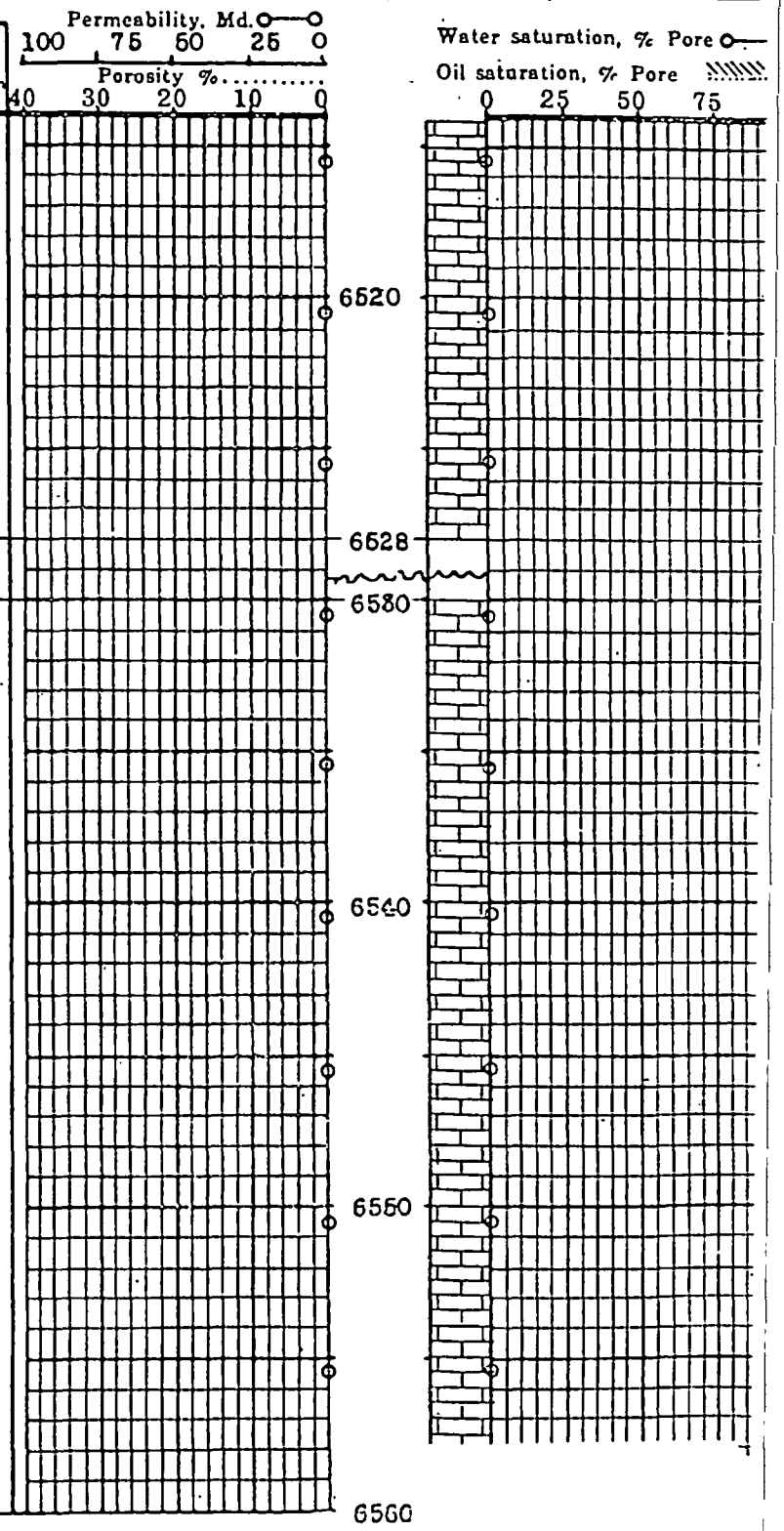
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

Field _____ Shale..... Unit _____

Lime.....

County _____ State _____ Remarks Core # 27 (Cont) # 28 (6530-6588')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6515.5	0.0	0.0	0.0	0.0	Nil
	6520.5	0.0	0.0	0.0	0.0	Nil
	6525.5	0.0	0.0	0.0	0.0	Nil
	6530.5	0.0	0.0	0.0	0.0	Nil
	6535.5	0.0	0.0	0.0	0.0	Nil
	6540.5	0.0	0.0	0.0	0.0	Nil
	6545.5	0.0	0.0	0.0	0.0	Nil
	6550.5	0.0	0.0	0.0	0.0	Nil
	6555.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

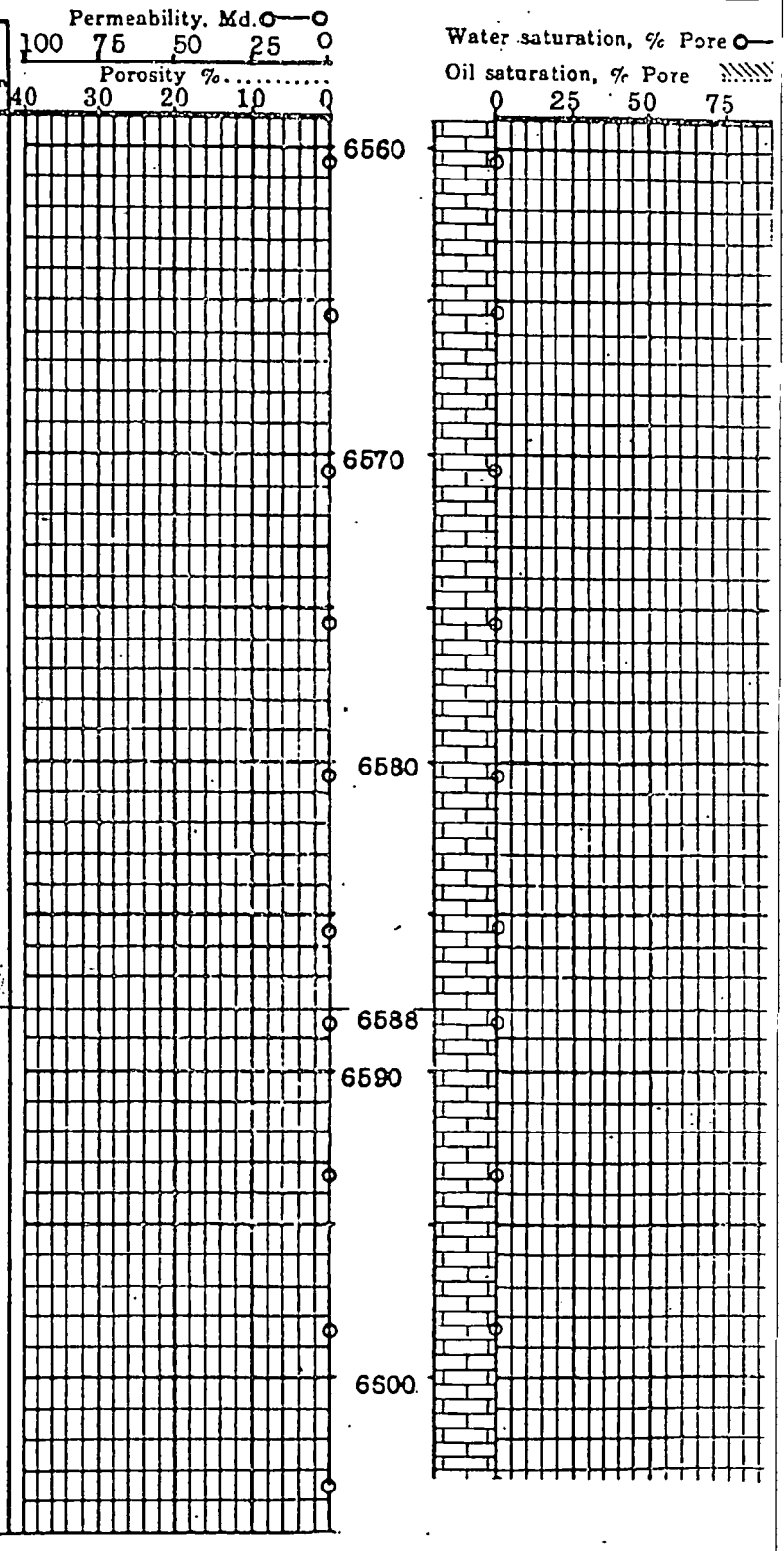
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____ Unit _____

County _____ State _____ Lime _____

Remarks Core # 28 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6560.5	0.0	0.0	0.0	0.0	Nil
	6565.5	0.0	0.0	0.0	0.0	Nil
	6570.5	0.0	0.0	0.0	0.0	Nil
	6575.5	0.0	0.0	0.0	0.0	Nil
	6580.5	0.0	0.0	0.0	0.0	Nil
	6585.5	0.0	0.0	0.0	0.0	Nil
	6588.5	0.0	0.0	0.0	0.0	Nil
	6593.5	0.0	0.0	0.0	0.0	Nil
	6598.5	0.0	0.0	0.0	0.0	Nil
	6603.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

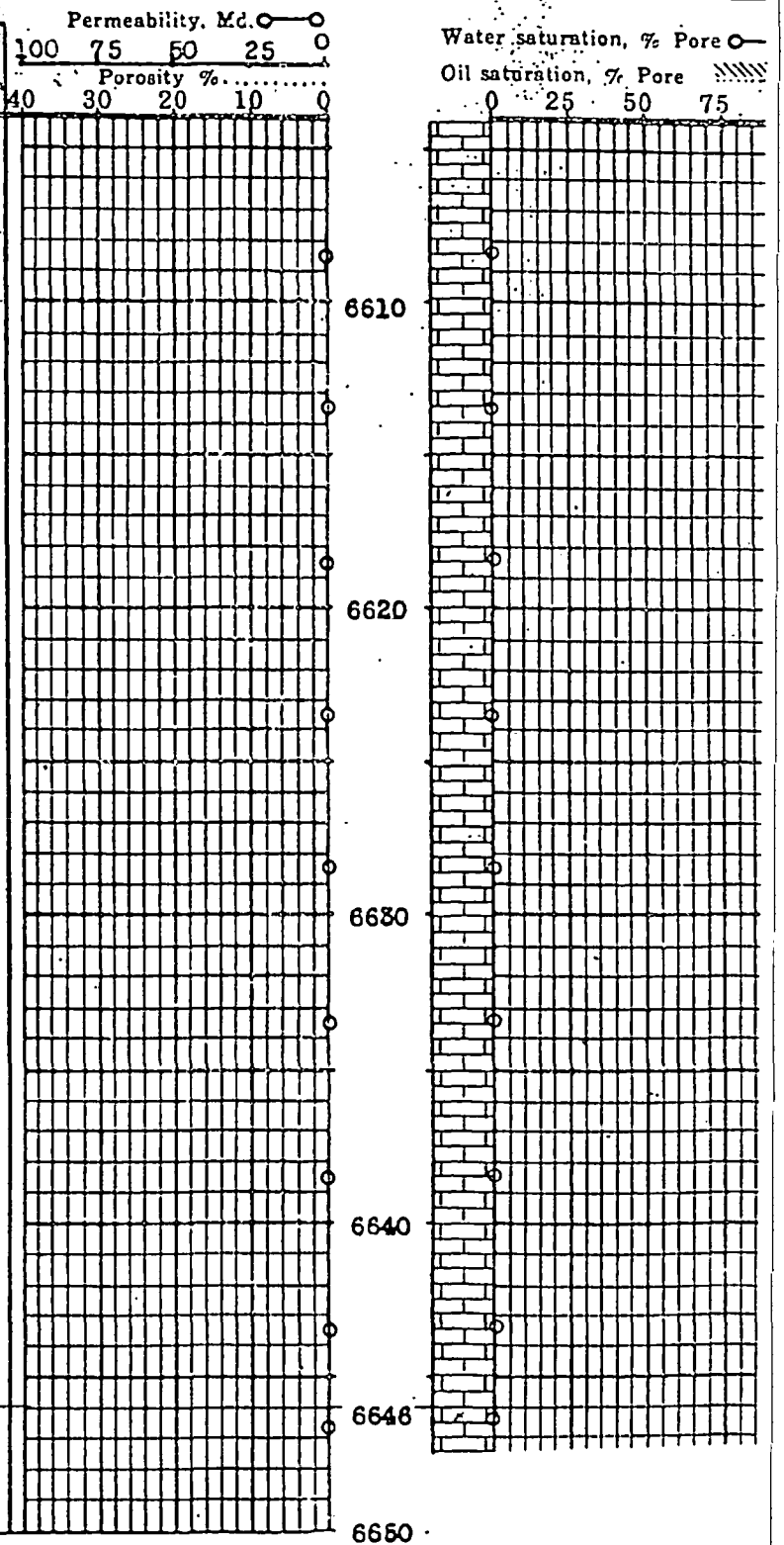
Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____

Lime _____ Unit _____

County _____ State _____ Remarks Core # 28 (Cont) # 30 (6646-6704')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6608.5	0.0	0.0	0.0	0.0	Nil
	6613.5	0.0	0.0	0.0	0.0	Nil
	6618.5	0.0	0.0	0.0	0.0	Nil
	6623.5	0.0	0.0	0.0	0.0	Nil
	6628.5	0.0	0.0	0.0	0.0	Nil
	6633.5	0.0	0.0	0.0	0.0	Nil
	6638.5	0.0	0.0	0.0	0.0	Nil
	6643.5	0.0	0.0	0.0	0.0	Nil
	6646.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

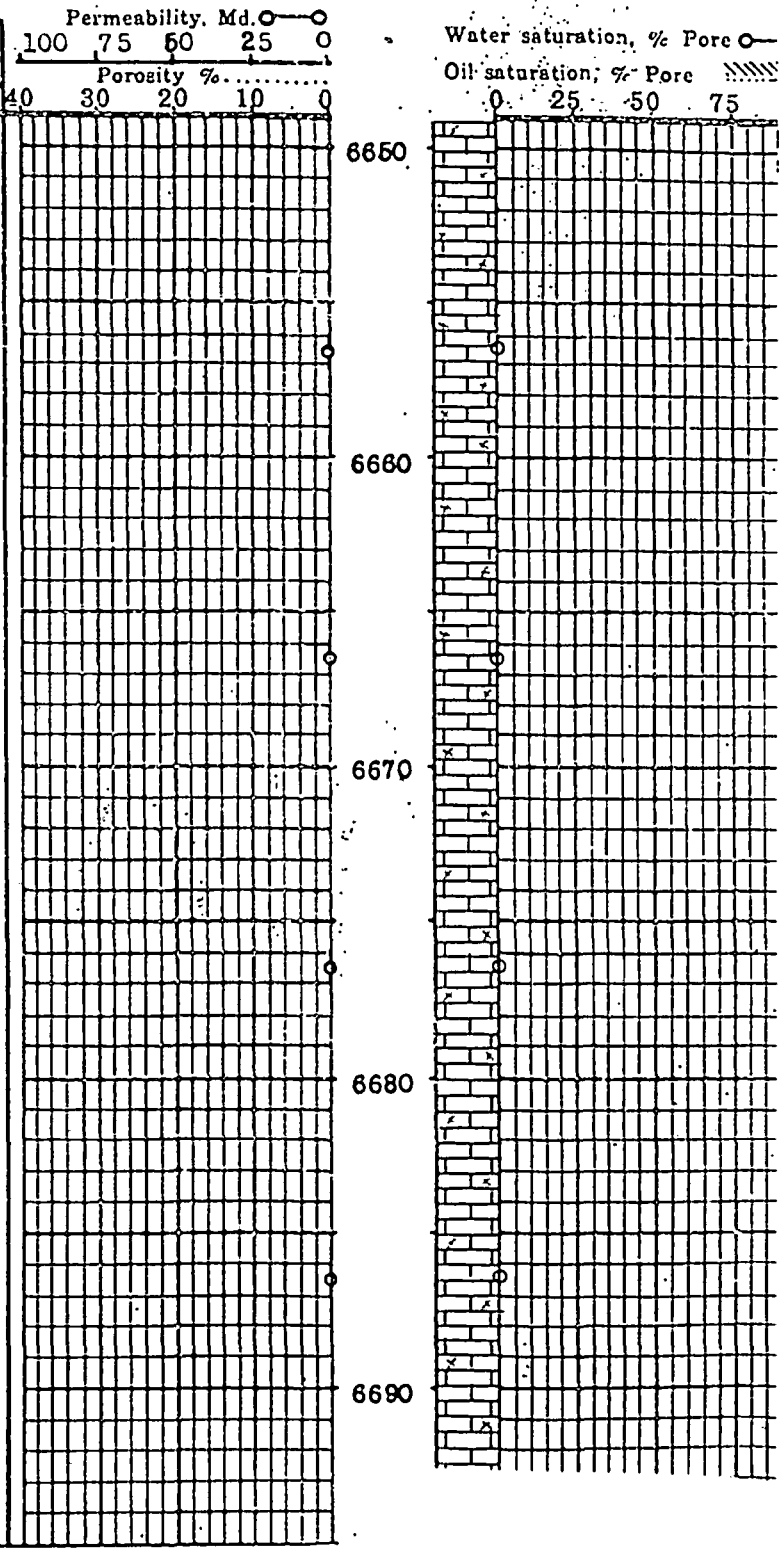
Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite.... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Remarks Core # 30 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6656.5	0.0	0.0	0.0	0.0	Nil
	6666.5	0.0	0.0	0.0	0.0	Nil
	6676.5	0.0	0.0	0.0	0.0	Nil
	6686.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

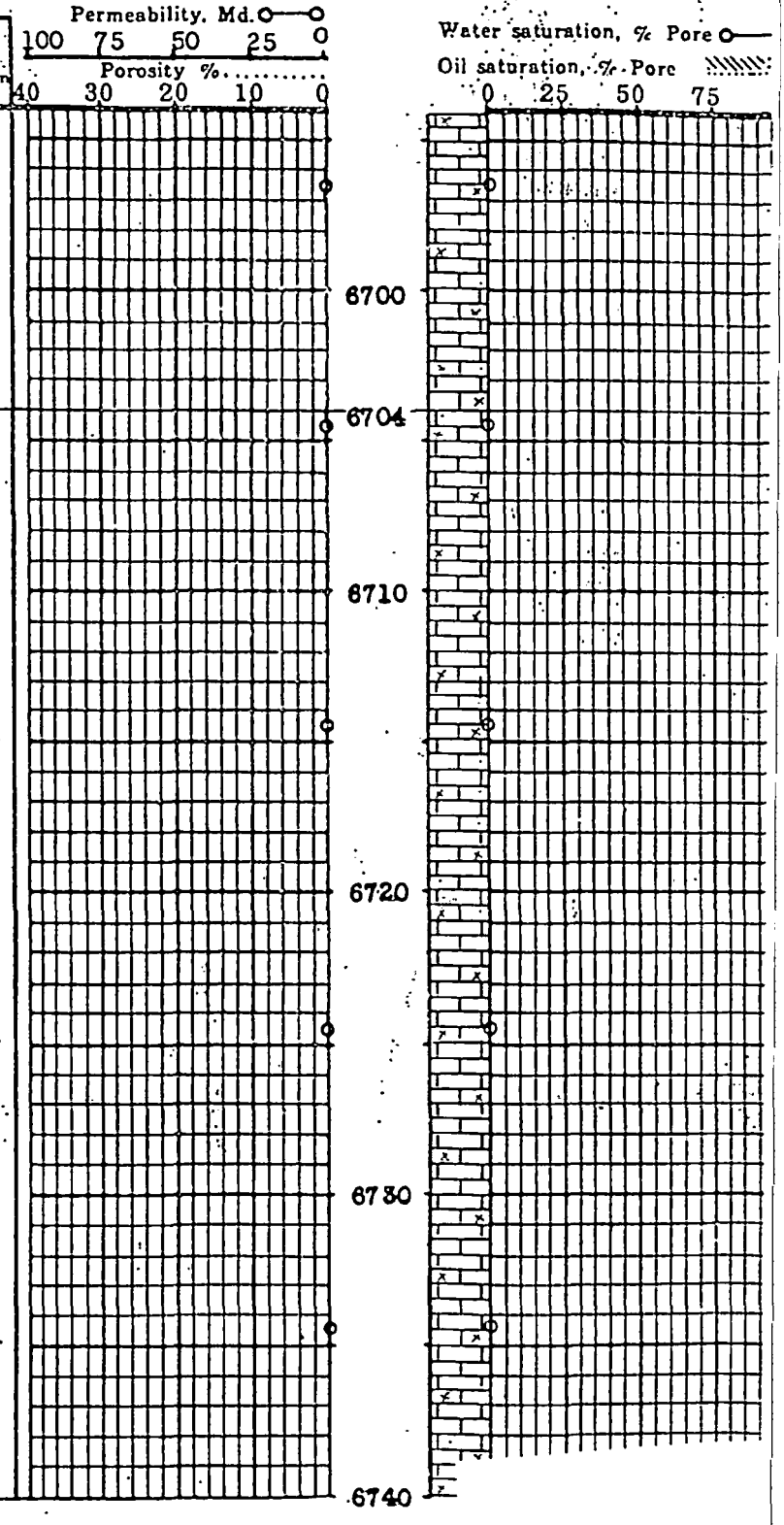
Company C. H. MURPHY JR. ET AL Location File

Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite.... Eng.

Field Shale..... Unit

County State Lime..... Remarks Core # 30 (Cont). # 31 (6704-6762')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6696.5	0.0	0.0	0.0	0.0	Nil
	6704.5	0.0	0.0	0.0	0.0	Nil
	6714.5	0.0	0.0	0.0	0.0	Nil
	6724.5	0.0	0.0	0.0	0.0	Nil
	6734.5	0.0	0.0	0.0	0.0	Nil



T..E HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

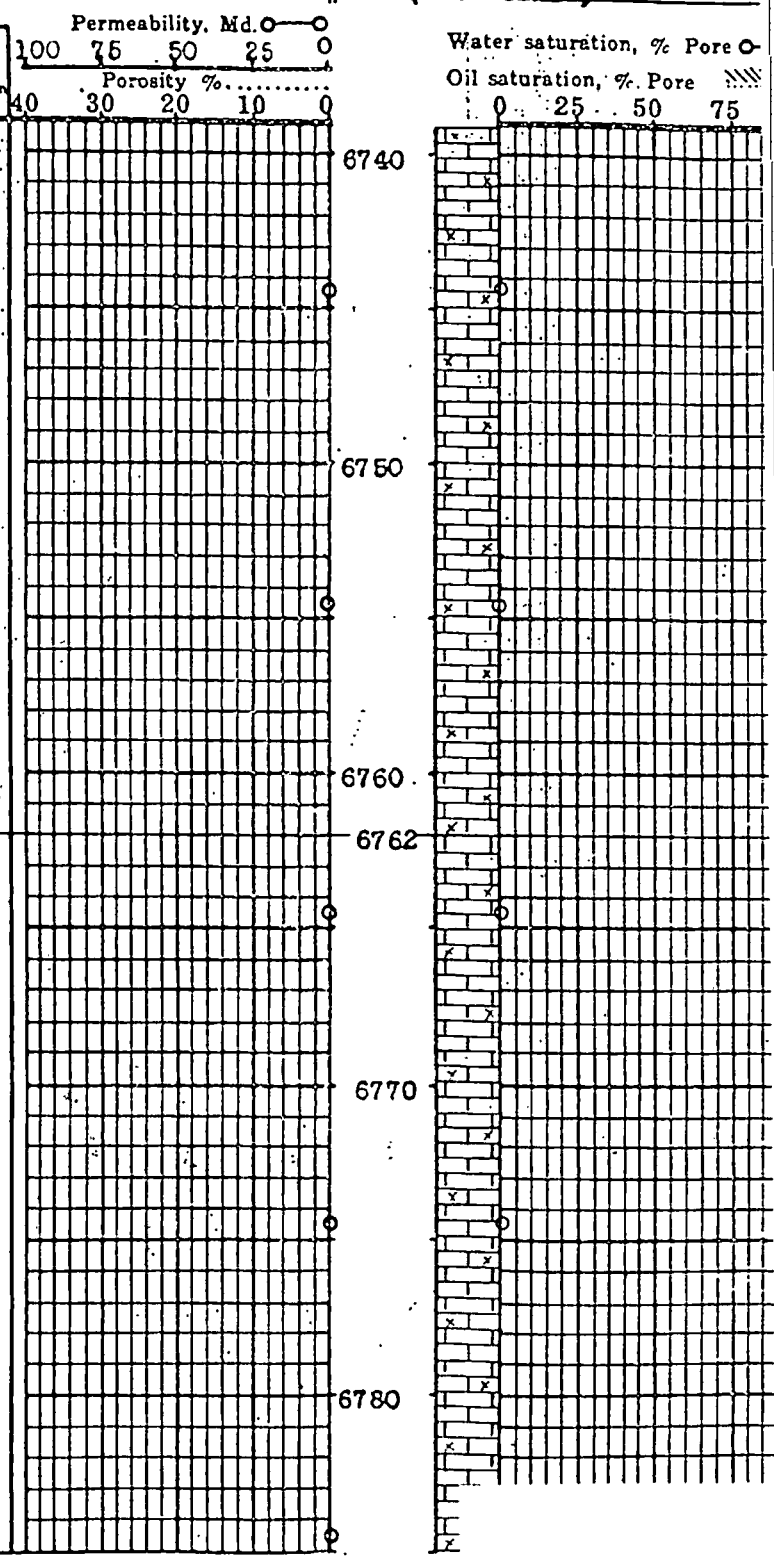
Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite..... Eng. _____

Field _____ Shale..... _____ Unit _____

Lime.....

County _____ State _____ Remarks Core # 31 (Cont) # 32 (6762-6821')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6744.5	0.0	0.0	0.0	0.0	Nil
	6754.5	0.0	0.0	0.0	0.0	Nil
	6764.5	0.0	0.0	0.0	0.0	Nil
	6774.5	0.0	0.0	0.0	0.0	Nil
	6784.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

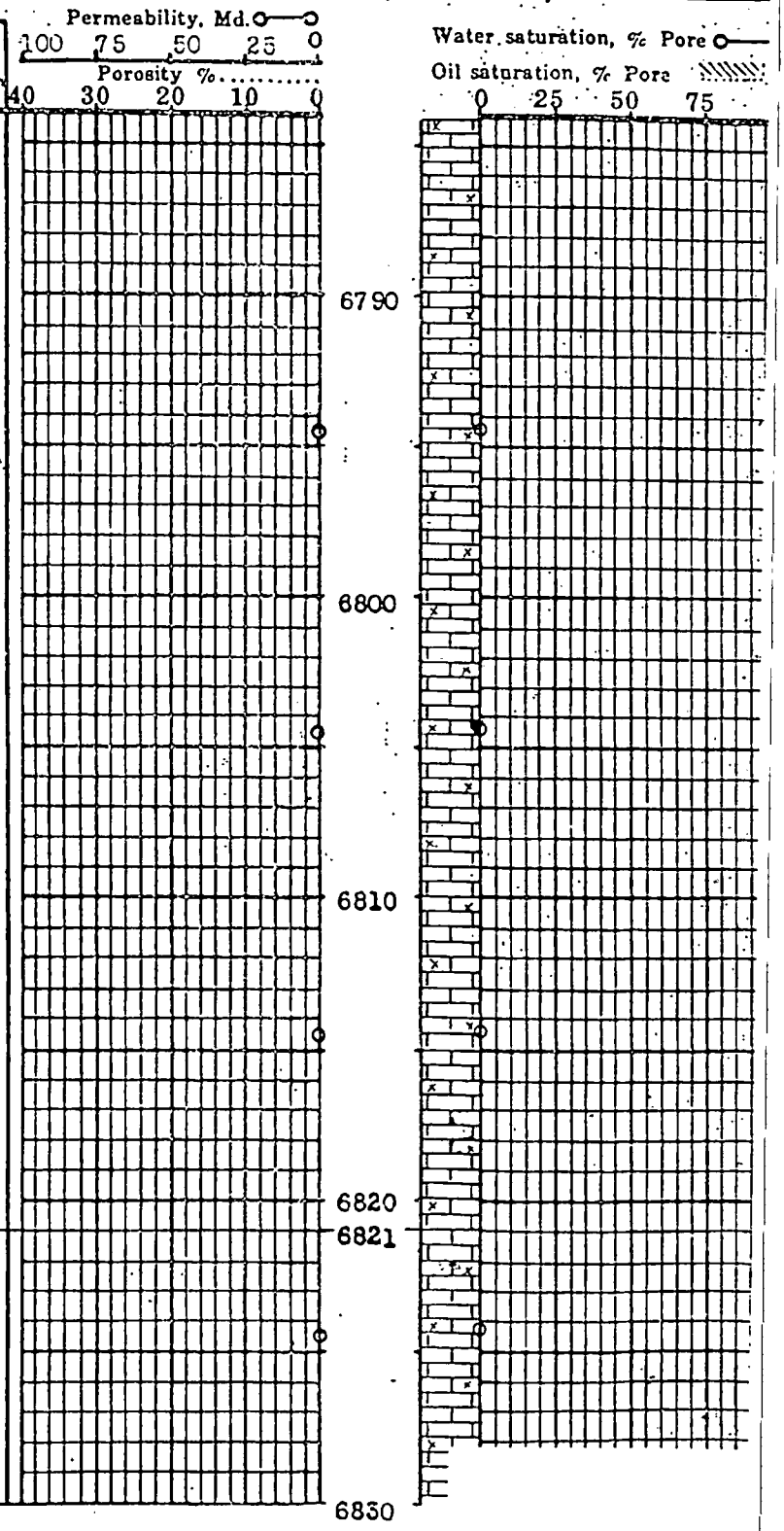
Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite..... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 32 (Cont) # 33 (6821-6879')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6794.5	0.0	0.0	0.0	0.0	Nil
	6804.5	0.0	0.0	0.0	0.0	Nil
	6814.5	0.0	0.0	0.0	0.0	Nil
	6824.5	0.0	0.0	0.0	0.0	Nil



TH HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL. Location _____ File _____

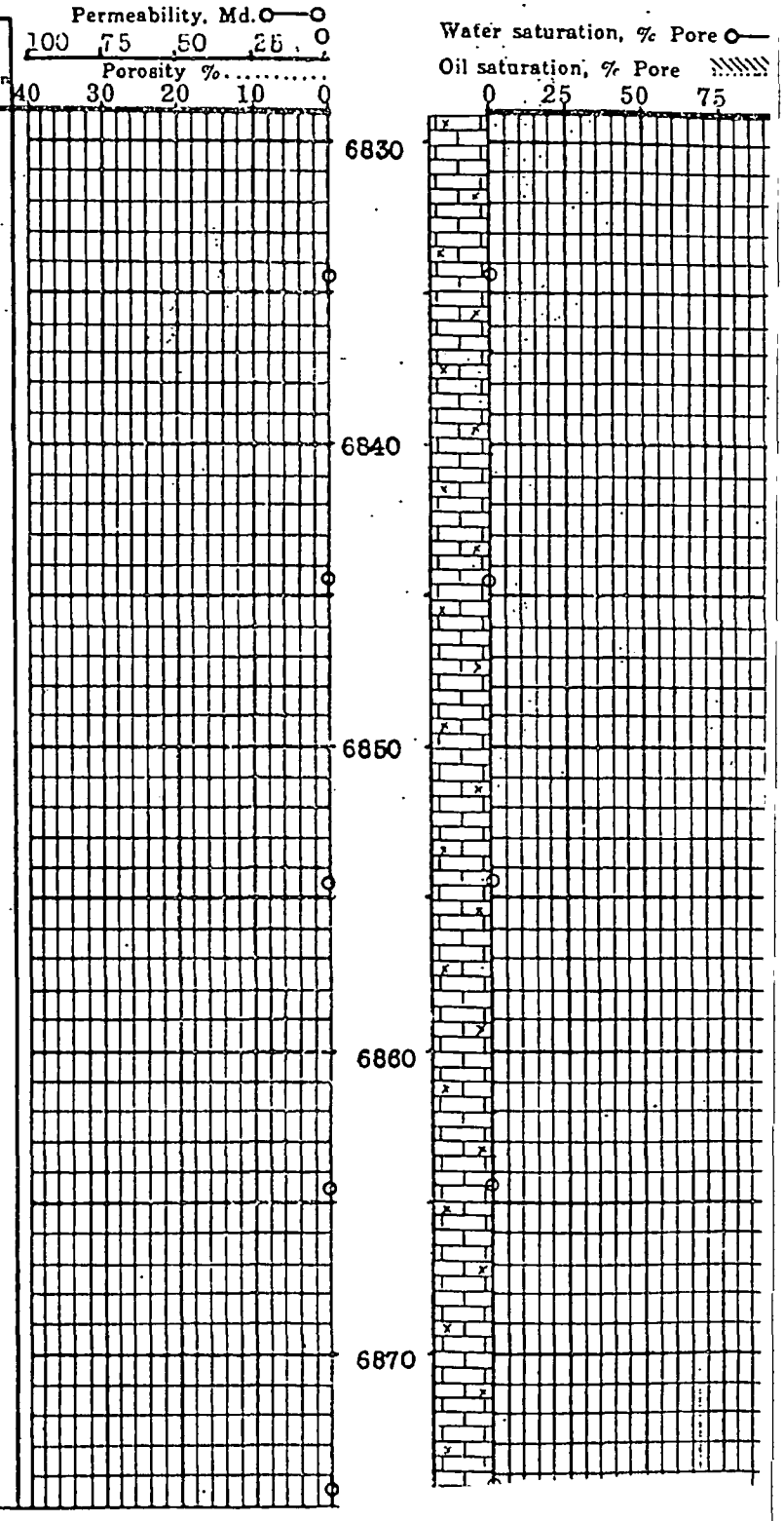
Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite.... Eng. _____

Field _____ Shale..... _____ Unit _____

Lime.....

County _____ State _____ Remarks Core # 33 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6834.5	0.0	0.0	0.0	0.0	Nil
	6844.5	0.0	0.0	0.0	0.0	Nil
	6854.5	0.0	0.0	0.0	0.0	Nil
	6864.5	0.0	0.0	0.0	0.0	Nil
	6874.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

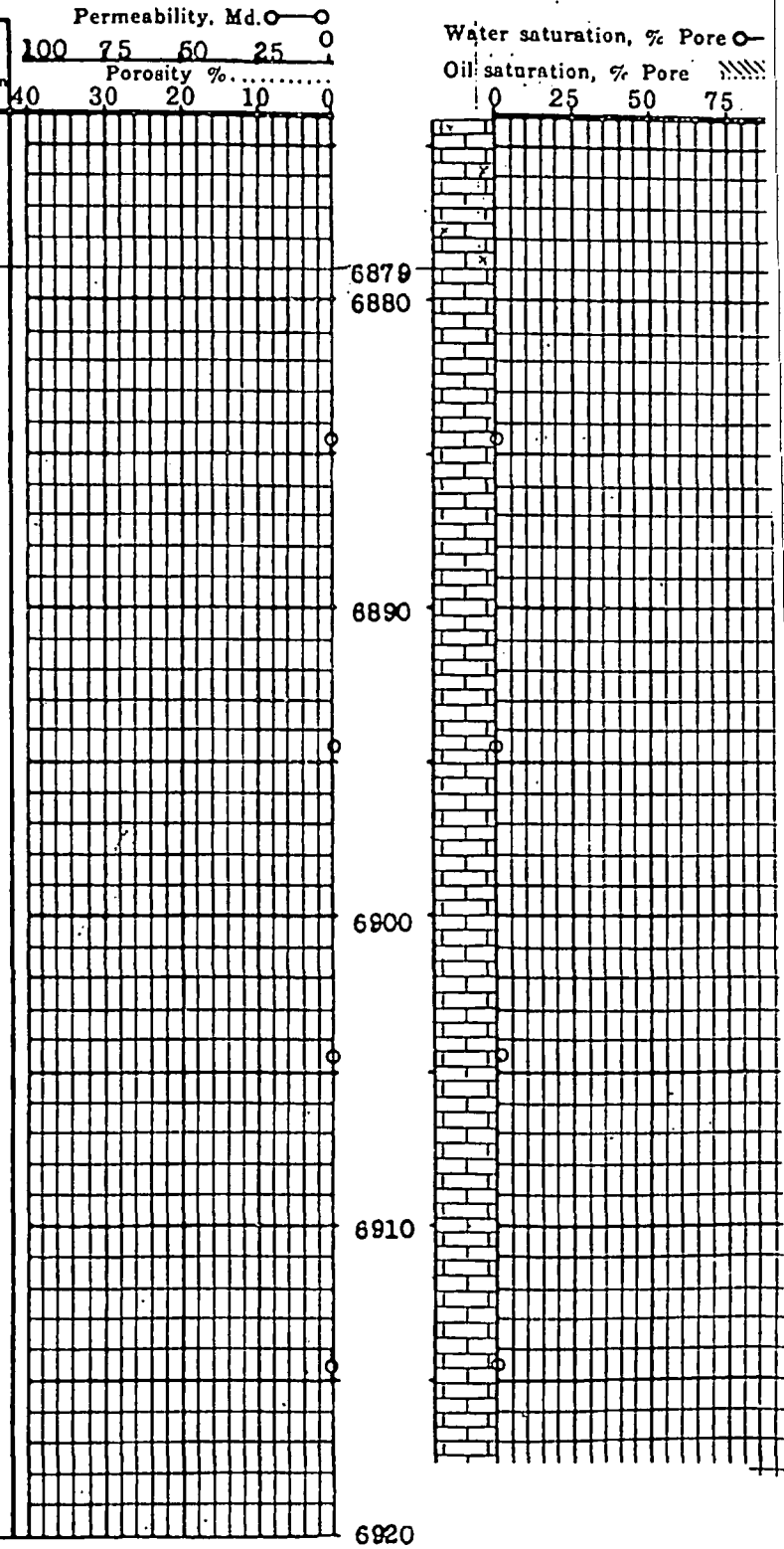
Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite.... Eng. _____

Shale..... _____

Field _____ Lime..... _____ Unit _____

County _____ State _____ Remarks Core # 33 (Cont) # 34 (6879-6937')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6884.5	0.0	0.0	0.0	0.0	Nil
	6894.5	0.0	0.0	0.0	0.0	Nil
	6904.5	0.0	0.0	0.0	0.0	Nil
	6914.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

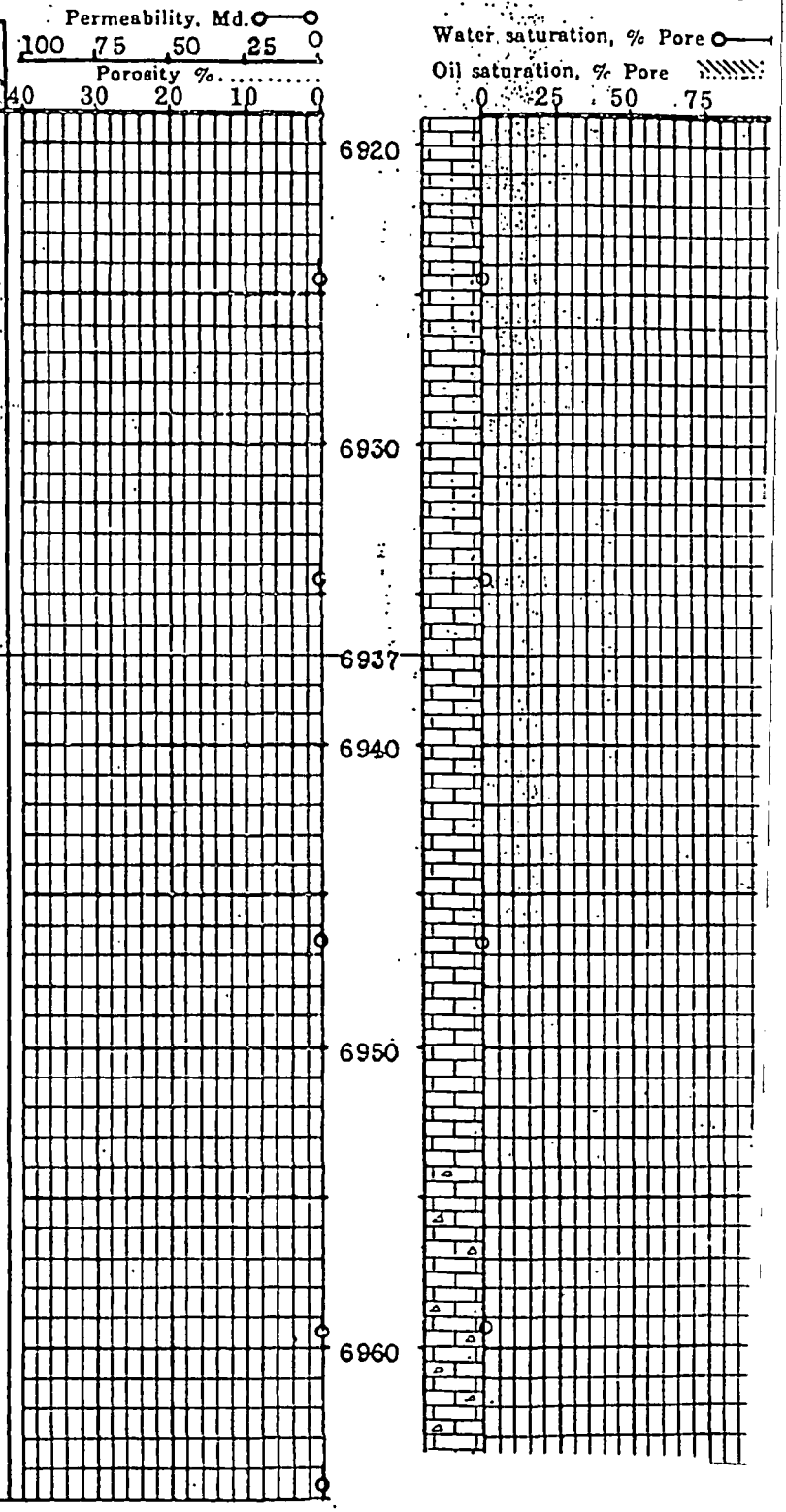
Well EAST POPLAR UNIT # 1 Legend: Sand..... Chert..... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 34 (Cont.) # 35 (6937-6996')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6924.5	0.0	0.0	0.0	0.0	Nil
	6954.5	0.0	0.0	0.0	0.0	Nil
	6946.5	0.0	0.0	0.0	0.0	Nil
	6959.5	0.0	0.0	0.0	0.0	Nil
	6964.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

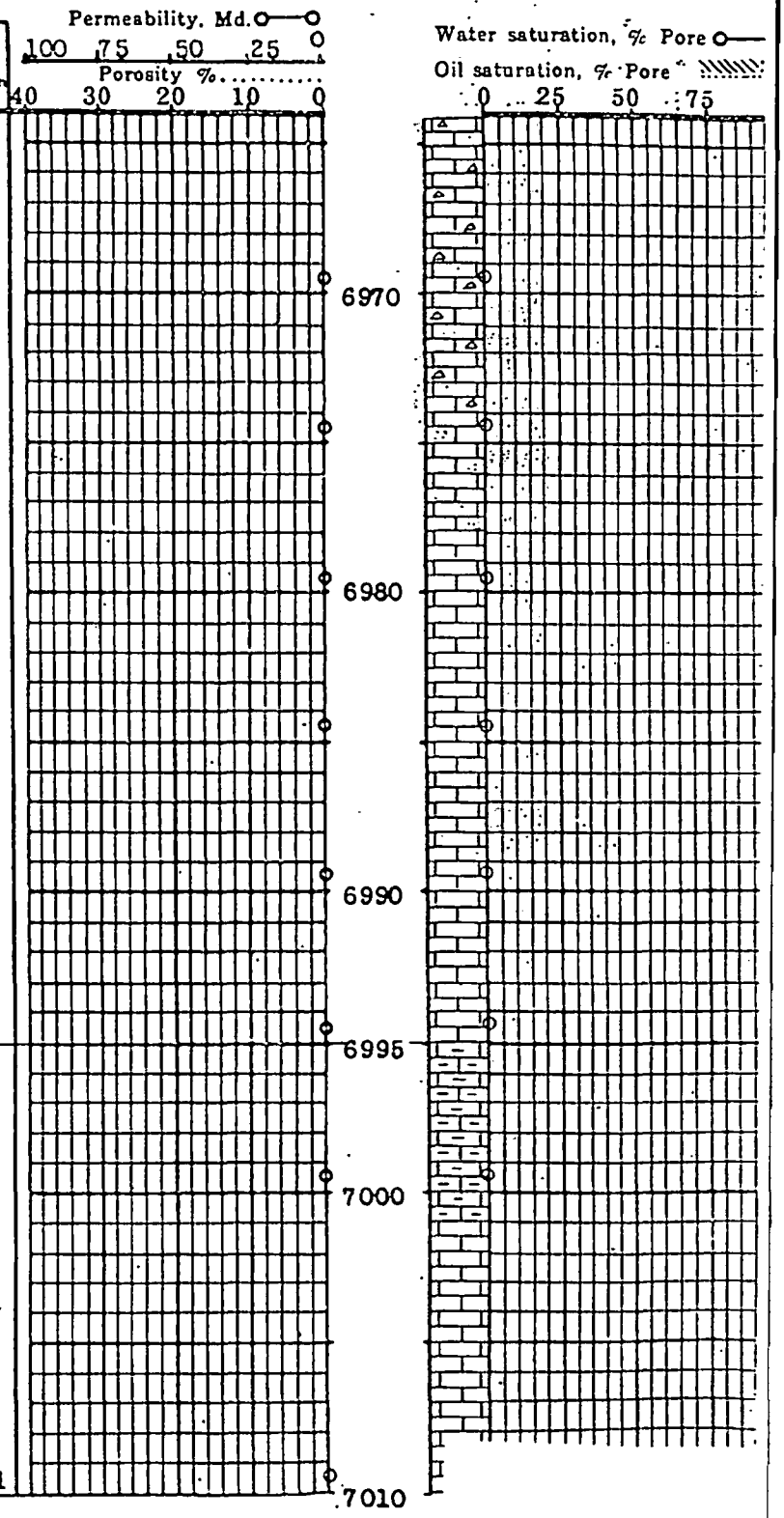
Well EAST POPLAR UNIT # 1 Legend: Sand..... Chert..... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 35 (Cont) # 36 (6995-7035')

Drilling Time Min/Ft	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	6969.5	0.0	0.0	0.0	0.0	Nil
	6974.5	0.0	0.0	0.0	0.0	Nil
	6979.5	0.0	0.0	0.0	0.0	Nil
	6984.5	0.0	0.0	0.0	0.0	Nil
	6989.5	0.0	0.0	0.0	0.0	Nil
	6994.5	0.0	0.0	0.0	0.0	Nil
	6999.5	0.0	0.0	0.0	0.0	Nil
	7009.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

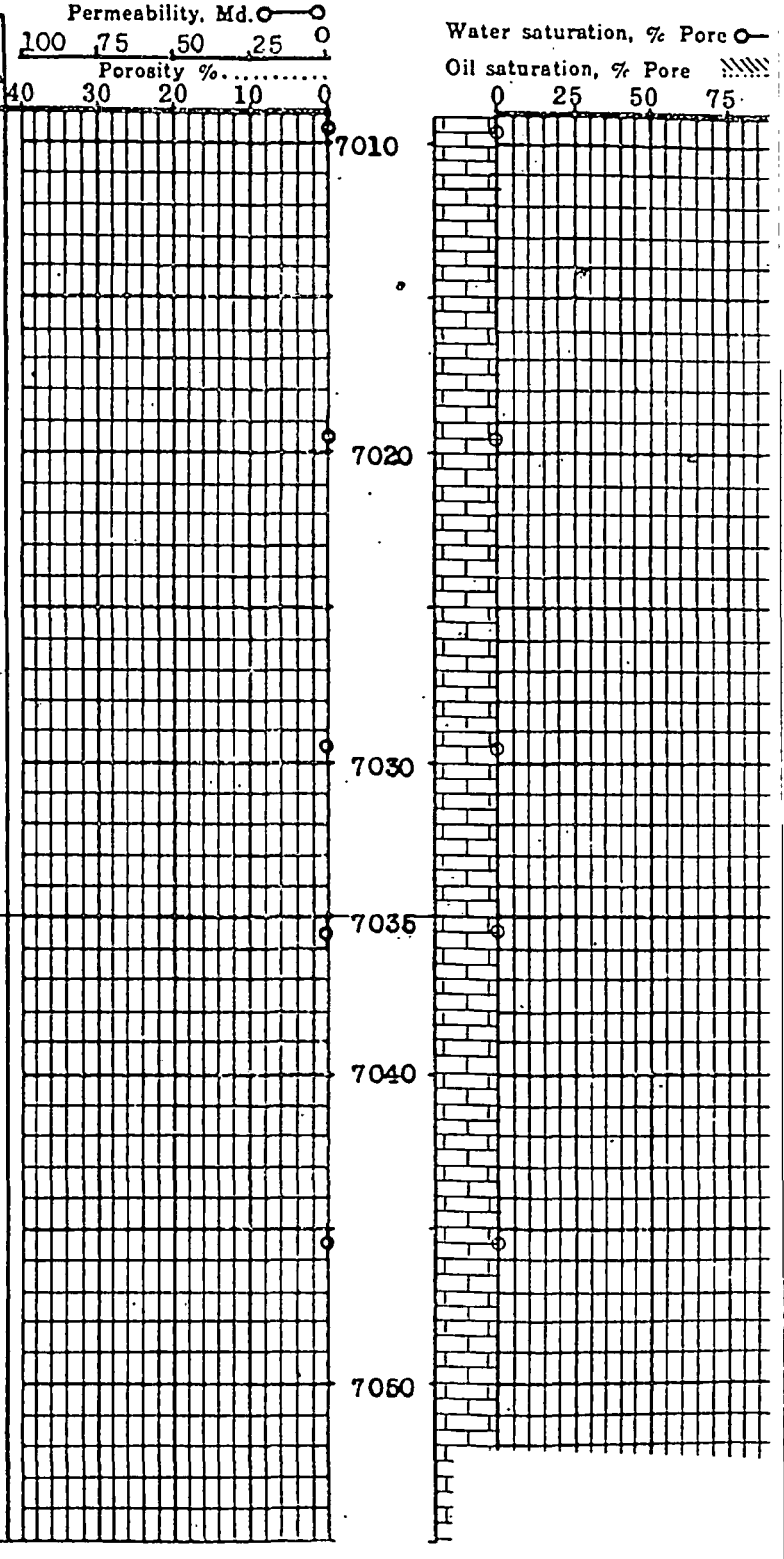
Well EAST POPLAR UNIT # 1 Legend: Sand..... Eng. _____

Field _____ Shale..... Unit _____

County _____ State _____ Lime.....

Remarks Core # 36 (Cont) # 37 (7035-7075')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7009.5	0.0	0.0	0.0	0.0	Nil
	7019.5	0.0	0.0	0.0	0.0	Nil
	7029.5	0.0	0.0	0.0	0.0	Nil
	7035.5	0.0	0.0	0.0	0.0	Nil
	7045.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand _____ Eng. _____

Field _____ Shale _____

Lime _____ Unit _____

County _____ State _____ Remarks Core # 37 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7055.6	0.0	0.0	0.0	0.0	Nil
	7065.5	0.0	0.0	0.0	0.0	Nil

Permeability, Md. 100 75 50 25 0

Porosity %..... 40 30 20 10 0

Water saturation, % Pore

Oil saturation, % Pore 0 25 50 75

7060

7070

7075

TH. HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL. Location _____ File _____

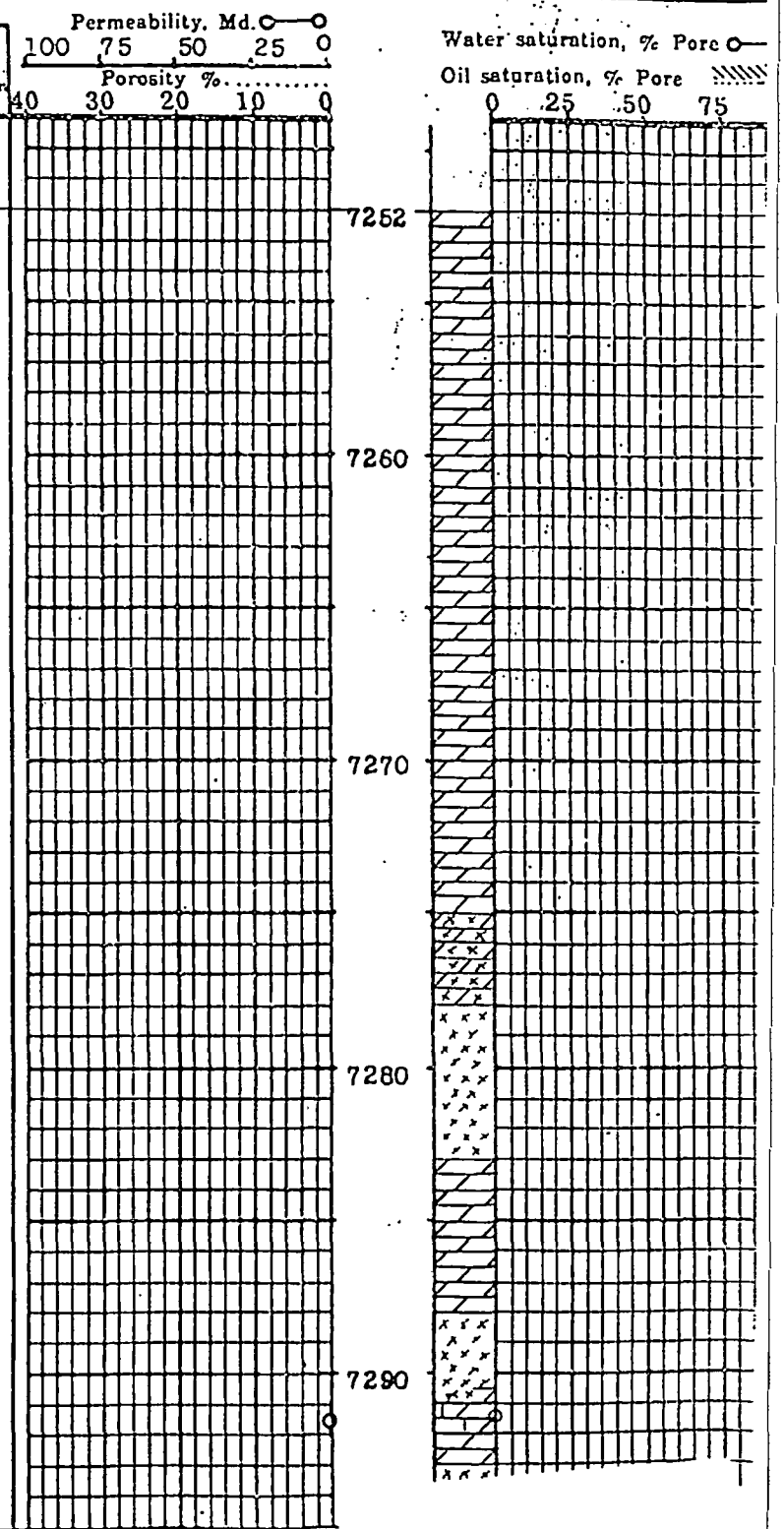
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

Lime.....

County _____ State _____ Remarks Core # 41 (7252-7310')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7291.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location File

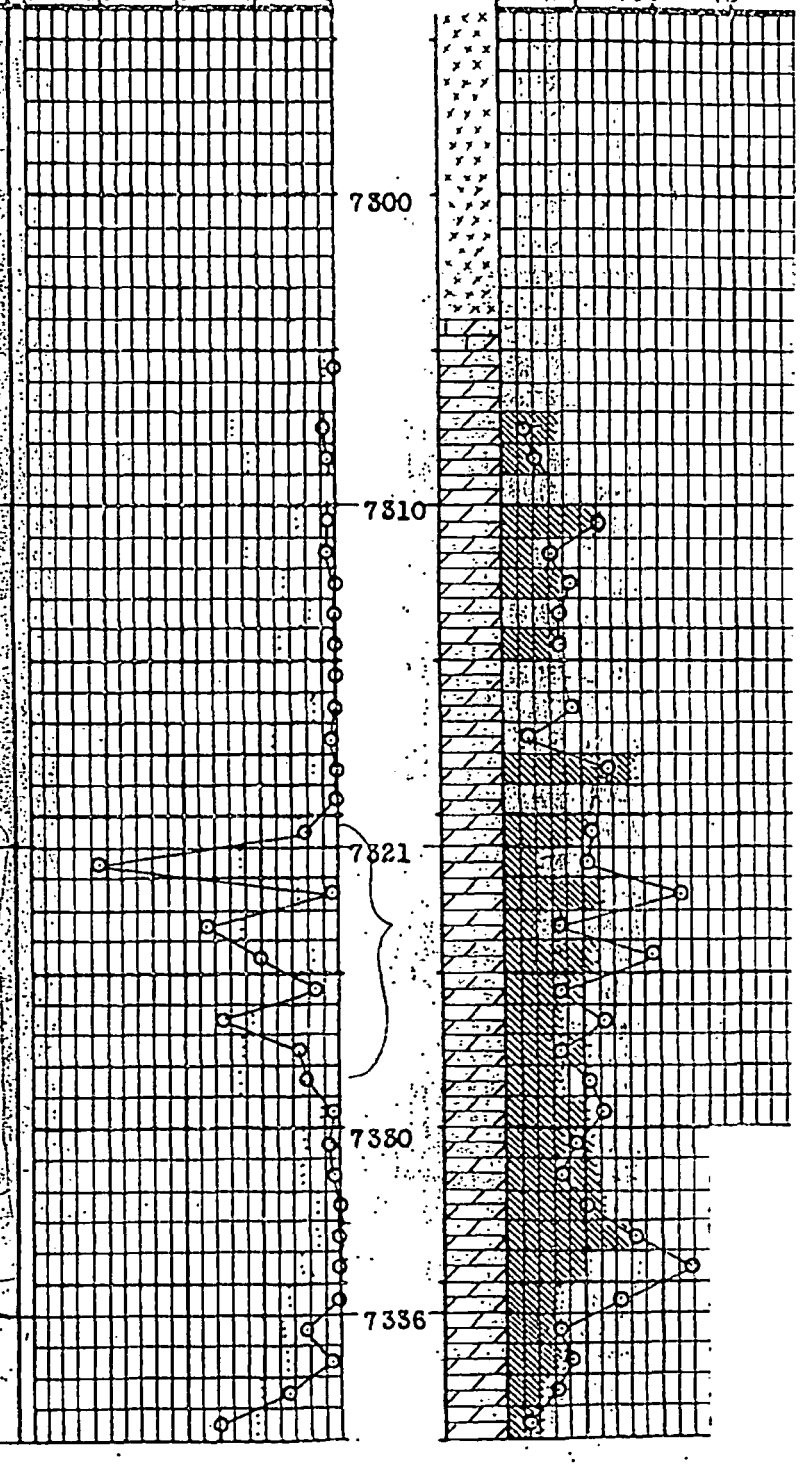
Well EAST POPLAR UNIT # 1 Legend: Sand, Shale, Lime, Dolomite, Anhydrite Elev.

Field Unit

County State Remarks Core # 41 (Cont) # 42 (7310-7321') # 43 (7321-7336') # 44 (7336-7394')

Permeability, Md. 100 75 50 25 0 Porosity % 40 30 20 10 0 Water saturation, % Pore Oil saturation, % Pore 0 25 50 75

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Water	Probable Production
	7305.5	0.0	1.7	0.0	100.0	Nil
	7307.5	4.0	13.2	18.2	7.8	
	7308.6	2.1	11.6	12.4	10.8	
	7310.5	3.3	4.8	31.7	31.7	Oil
	7311.5	3.3	11.7	11.9	15.9	Oil
	7312.5	0.0	6.3	21.5	21.5	Nil
	7313.6	0.0	3.9	0.0	19.9	Nil
	7314.6	0.0	7.5	17.2	18.7	Nil
	7315.5	0.0	0.0	0.0	0.0	Nil
	7316.5	0.0	3.2	0.0	23.1	Nil
	7317.5	0.4	8.2	0.0	8.9	Nil
	7318.6	0.0	3.0	43.3	34.8	Nil
	7319.5	0.0	0.0	0.0	0.0	Nil
	7320.5	11.5	4.5	28.8	28.8	Oil
	7321.5	77.0	12.8	12.3	26.3	Oil
	7322.6	0.4	6.6	26.1	56.6	Oil
	7323.6	43.0	12.5	12.2	17.4	Oil
	7324.5	25.0	3.9	29.9	47.8	Oil
	7325.5	8.8	10.0	24.5	17.8	Oil
	7326.5	36.0	11.1	18.8	31.4	Oil
	7327.6	13.0	12.2	26.1	17.3	Oil
	7328.6	11.0	12.5	18.3	26.7	Oil
	7329.5	0.9	2.6	20.1	30.2	Oil
	7330.5	3.7	4.3	28.1	22.5	Oil
	7331.6	0.7	4.7	28.3	18.9	Oil
	7332.6	0.0	3.2	31.3	25.0	Nil
	7333.6	0.0	3.0	41.1	41.1	Nil
	7334.5	0.0	5.0	26.4	69.3	Nil
	7335.5	0.0	6.3	17.8	35.6	Nil
	7336.5	10.8	7.8	17.4	17.4	Oil
	7337.5	2.9	7.1	18.1	20.8	Oil
	7338.5	16.0	10.2	13.4	15.7	Oil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

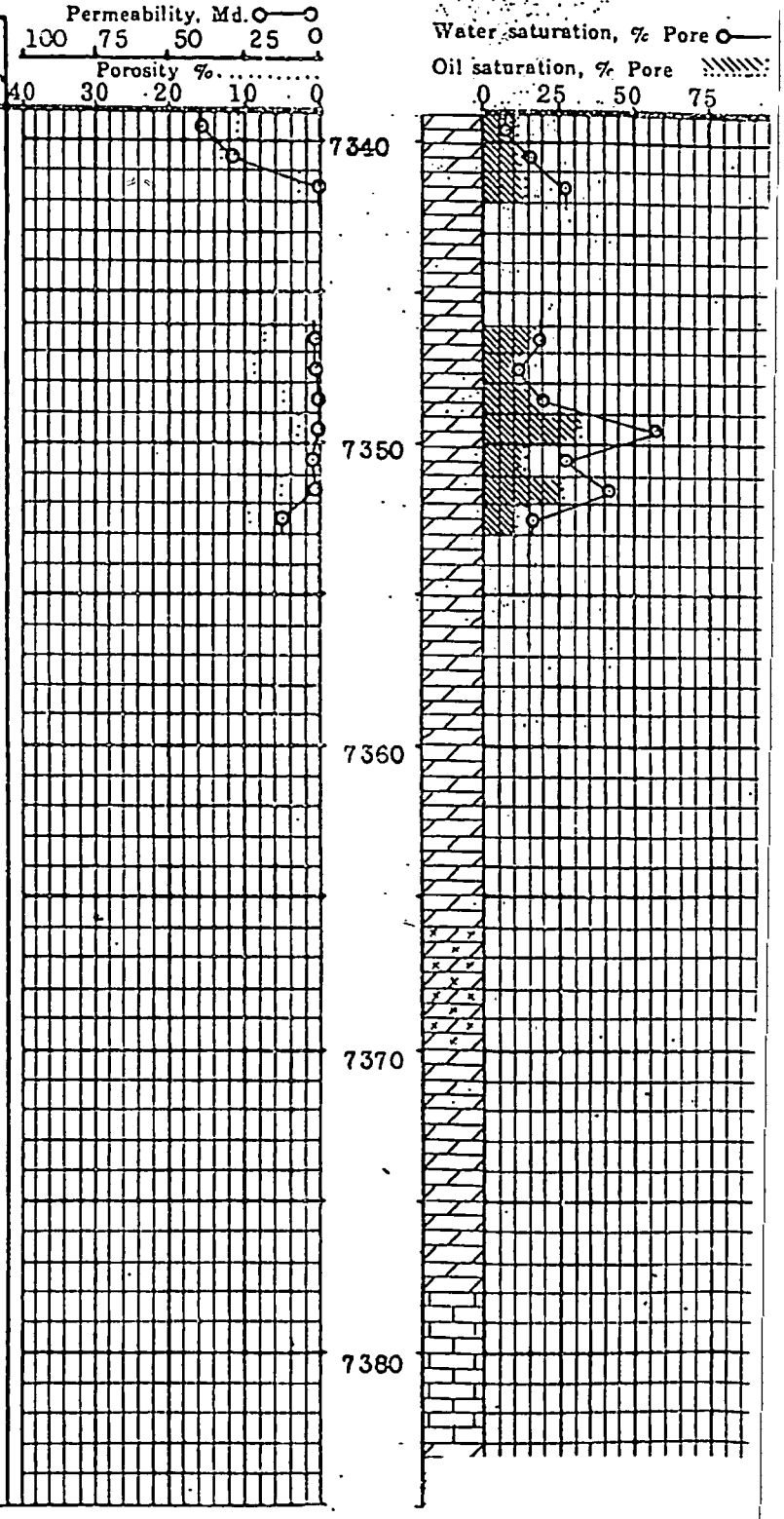
Company C. H. MURPHY JR. ET AL Location File

Well EAST POPLAR UNIT # 1 Legend: Sand, Shale, Lime, Dolomite, Anhydrite Eng.

Field Unit

County State Remarks Core # 44 (Cont)

Drilling Time Min/Ft	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7339.5	39.5	10.7	11.0	8.8	Oil
	7340.5	28.0	13.1	12.2	15.7	Oil
	7341.5	0.0	3.3	14.1	28.2	Nil
	7346.5	0.5	7.6	19.7	19.7	Oil
	7347.5	0.1	8.5	12.7	12.7	Oil
	7348.5	0.0	5.0	21.6	21.6	Nil
	7349.5	0.0	3.1	32.3	58.1	Nil
	7350.5	2.0	8.0	14.6	27.7	Oil
	7351.5	0.3	5.4	26.4	42.3	Oil
	7352.5	12.1	9.9	11.2	16.9	Oil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

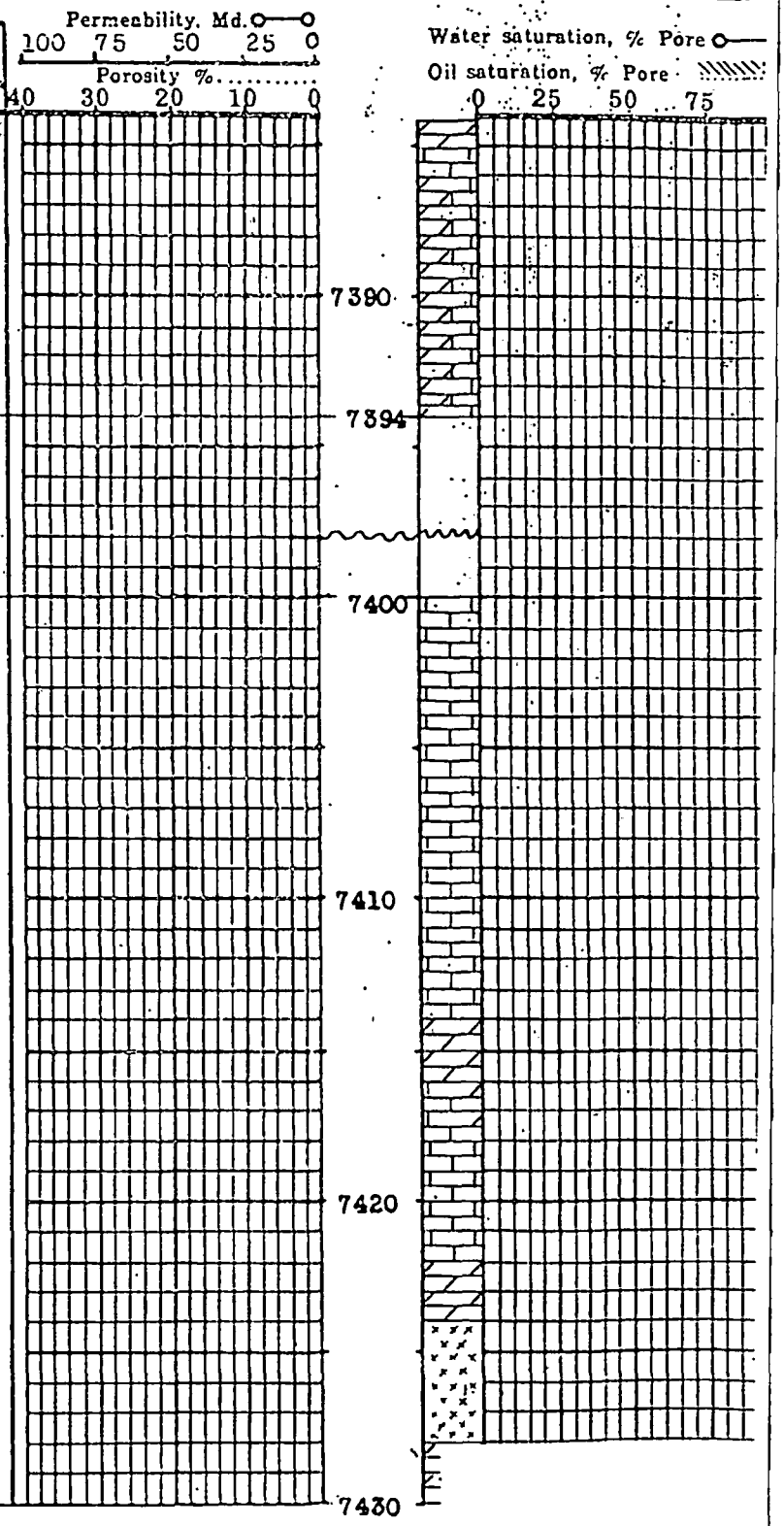
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite.....

Lime..... Unit _____

County _____ State _____ Remarks Core # 44 (Cont)# 45 (7400-7458')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

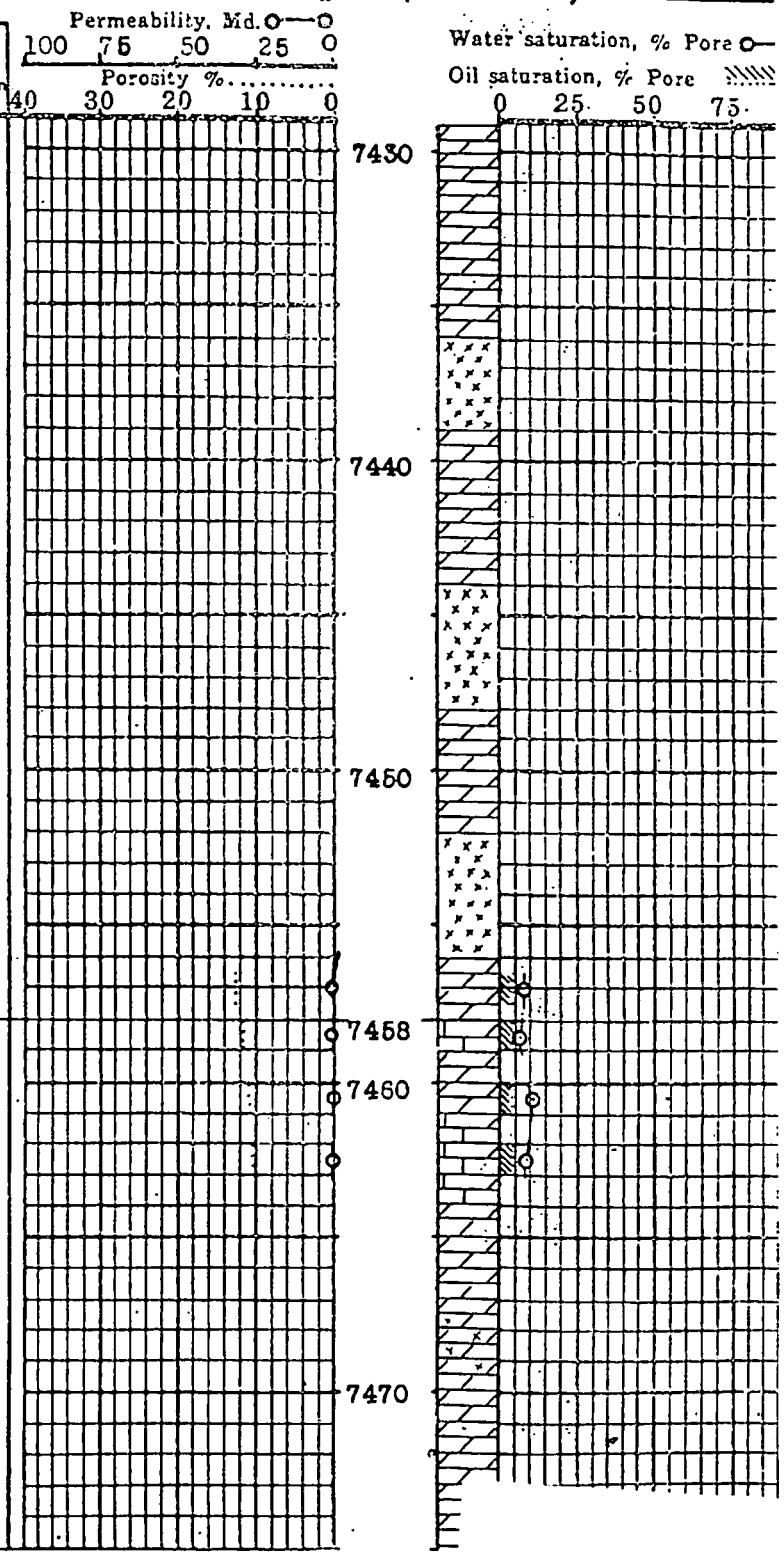
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

County _____ State _____ Lime.....

Remarks Core # 45 (Cont) # 46 (7458-7516')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7456-58	0.0	12.5	4.0	7.1	Nil
	7458.5	0.0	11.9	4.3	8.6	Nil
	7460.5	0.0	10.8	4.7	11.3	Nil
	7462.5	0.0	10.3	4.7	9.4	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

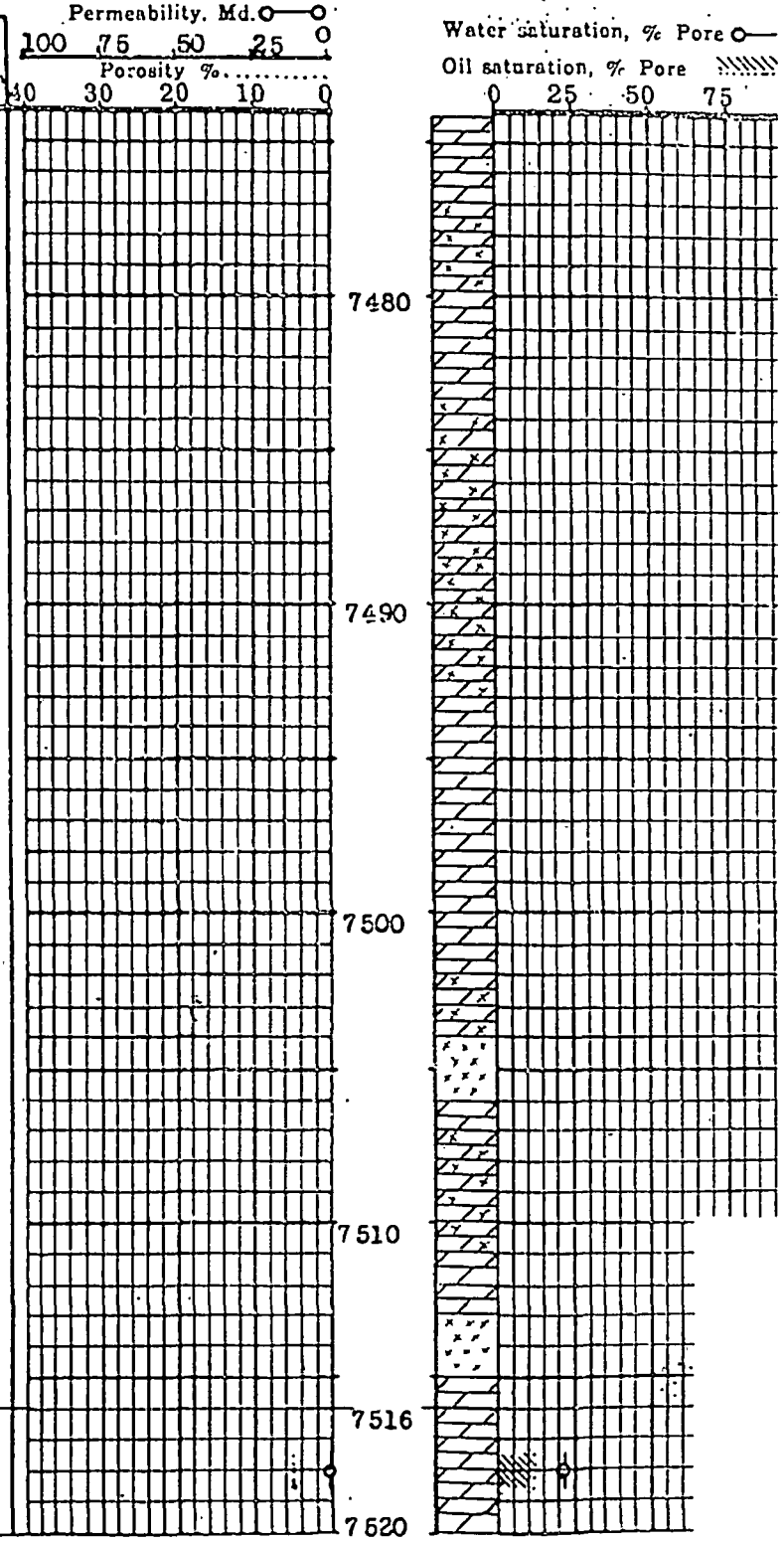
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

Lime..... _____

County _____ State _____ Remarks Core # 46 (Cont) # 47 (7516-7557')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7516-20	0.0	5.1	11.3	22.6	Nil



Th HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL. Location _____ File _____

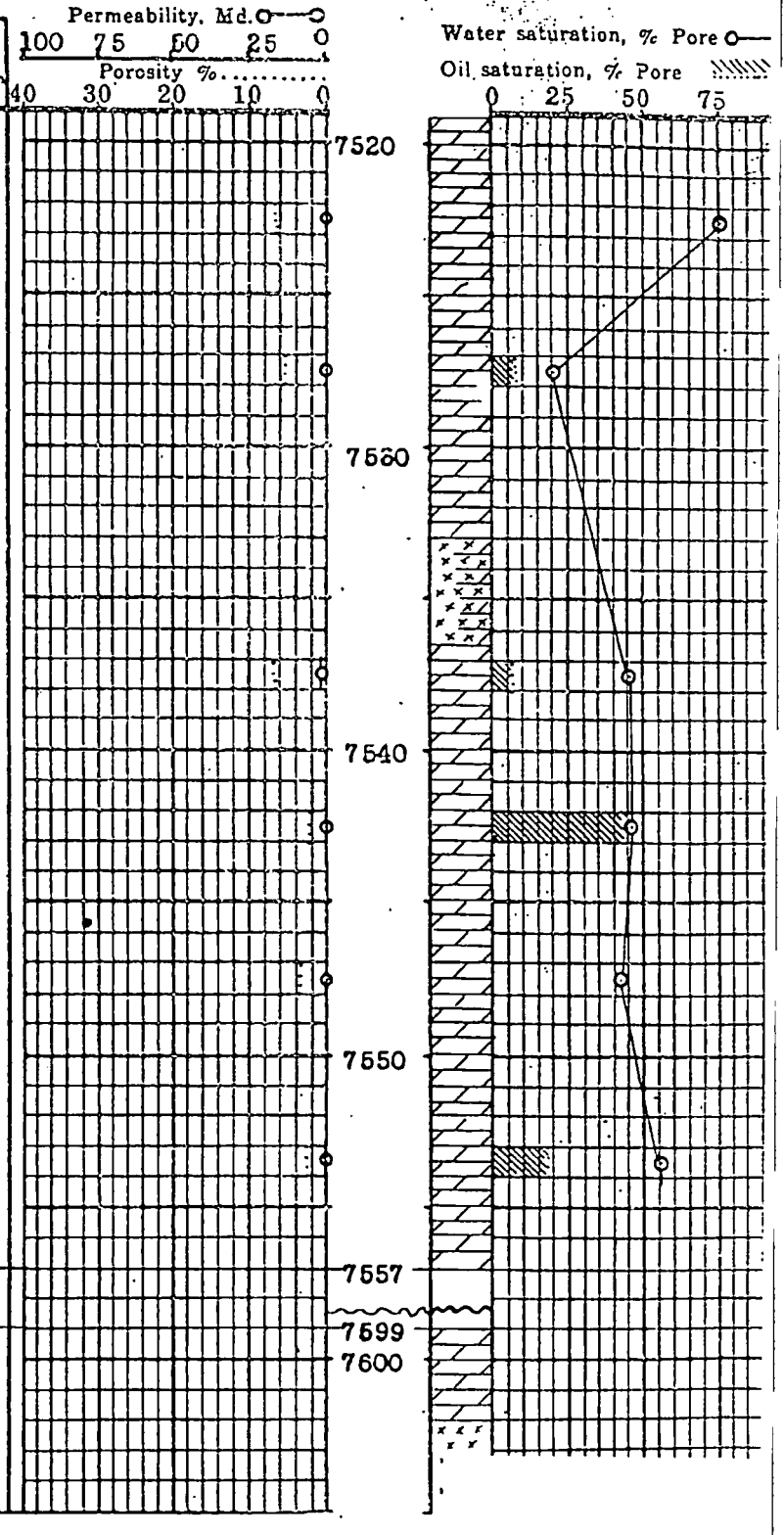
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite.... Unit _____

Lime.....

County _____ State _____ Remarks Core # 47 (Cont) # 49 (7599-7657')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7520-25	0.0	6.4	0.0	75.8	Nil
	7525-30	0.0	5.5	8.4	21.0	Nil
	7535-40	0.4	6.3	6.9	45.2	Nil
	7540-45	0.0	2.4	46.3	46.8	Nil
	7545-50	0.0	3.9	0.0	43.9	Nil
	7550-57	0.0	2.5	18.6	55.8	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Shale..... Anhydrite.....

Field _____ Lime..... _____ Unit _____

County _____ State _____ Remarks Core # 49 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production

Permeability, Md. 100 75 50 25 0

Porosity %..... 40 30 20 10 0

Water saturation, % Pore

Oil saturation, % Pore 0 25 50 75

7610

7620

7630

7640

7650

THE HYCALOG COMPANY

CORE ANALYSIS REPORT

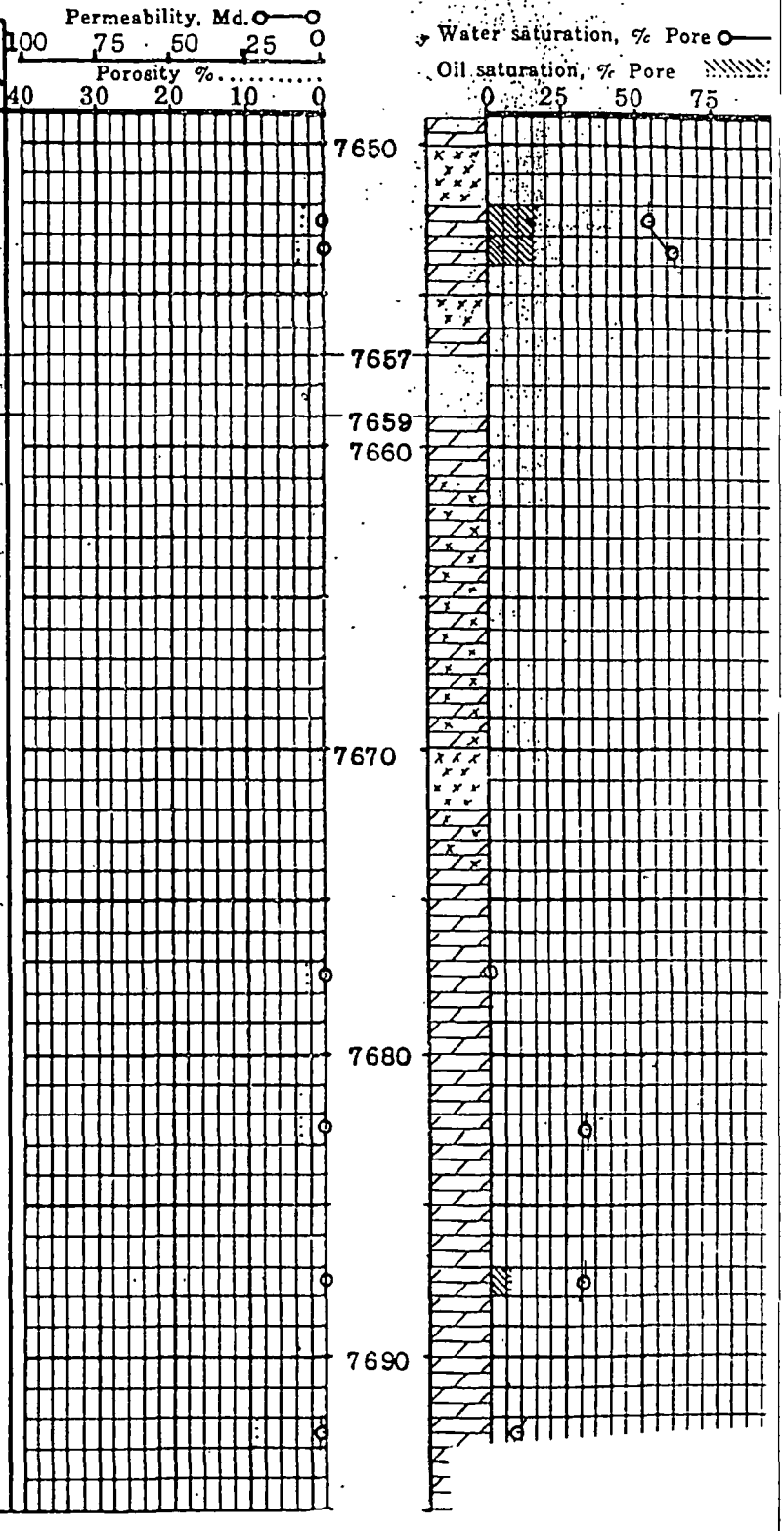
Company C. H. MURPHY JR. ET AL Location File

Well EAST POPLAR UNIT # 1 Legend: Sand, Shale, Lime, Dolorite, Anhydrite Eng.

Field Unit

County State Remarks Core # 49 (Cont) # 50 (7659-7717')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7652.5	0.0	2.8	18.2	54.6	Nil
	7653.5	0.0	3.2	15.4	62.4	Nil
	7677.5	0.0	2.4	0.0	0.0	Nil
	7682.5	0.0	3.8	0.0	36.1	Nil
	7687.5	0.0	8.0	5.8	31.6	Nil
	7692.5	0.7	9.4	0.0	9.6	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

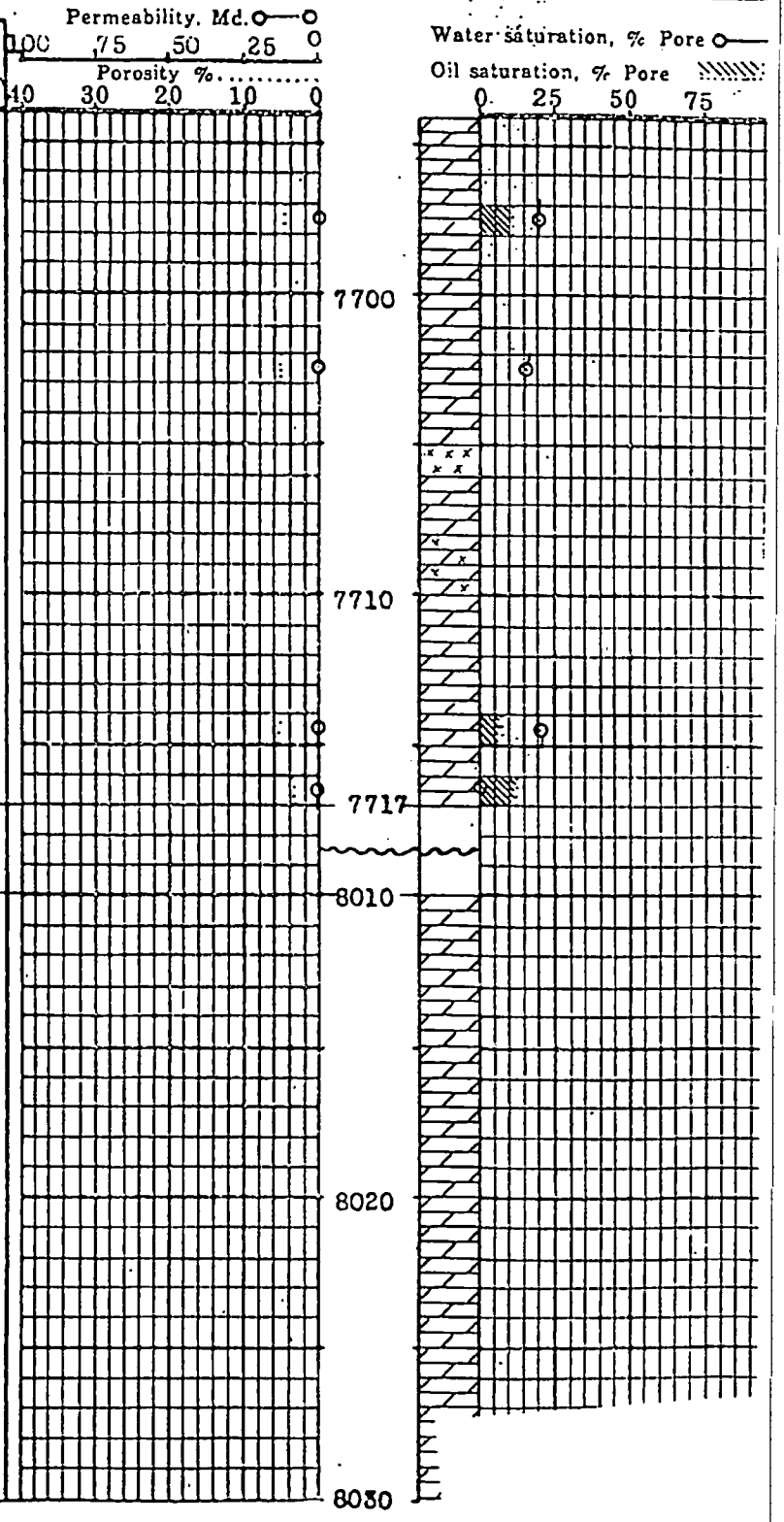
Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

County _____ State _____ Remarks Core # 50 (Cont) # 56 (8010-8068')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	7697.5	0.0	4.6	10.4	20.8	Nil
	7702.5	0.0	5.4	0.0	16.6	Nil
	7714.5	0.0	5.7	8.3	20.7	Nil
	7716.5	0.0	3.4	12.7	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

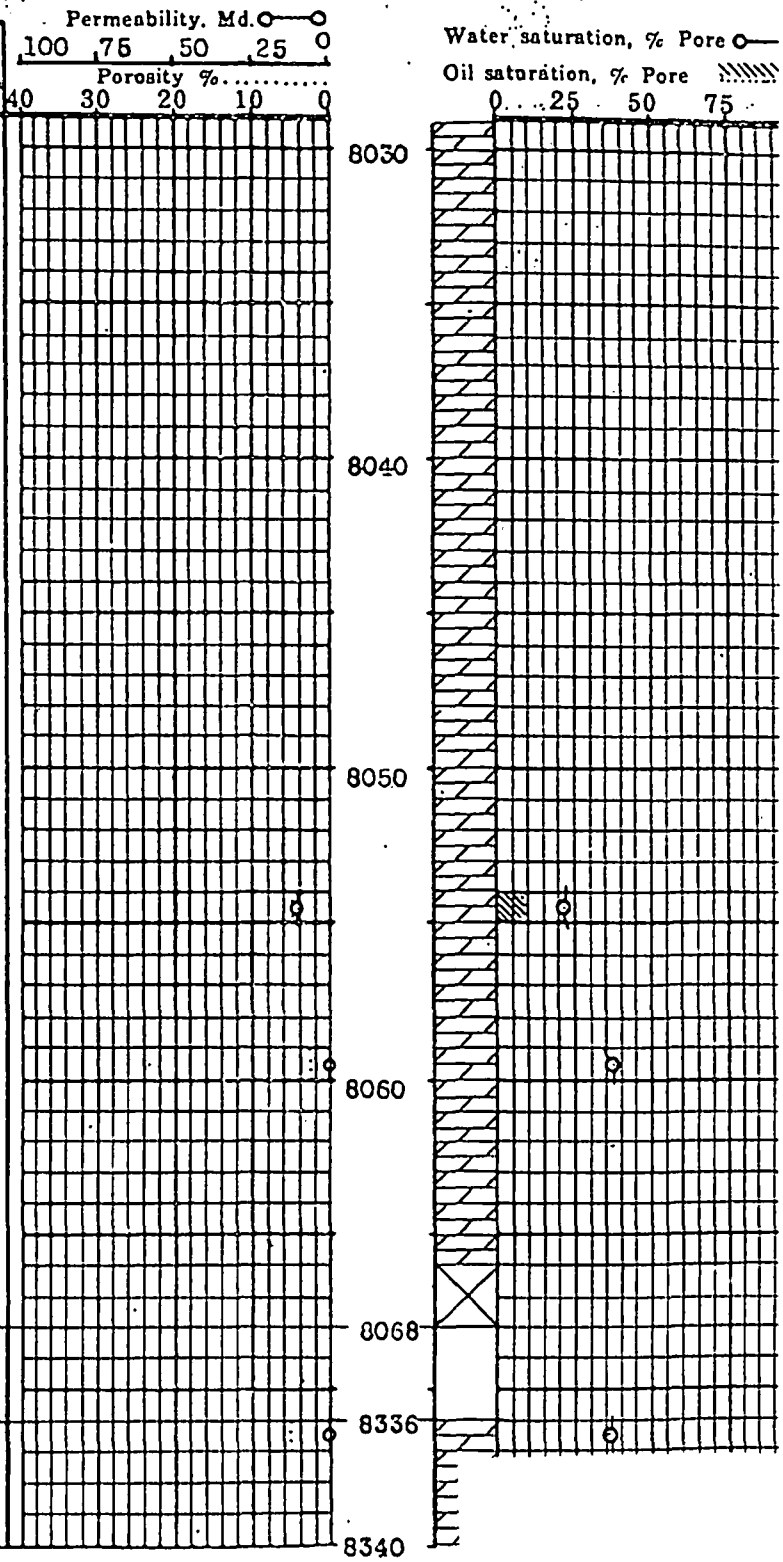
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite.... Eng. _____

Field _____ Shale.... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 56 (Cont) # 62 (8336-8356')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8054.5	10.7	5.1	9.1	22.6	Oil
	8059.5	0.0	2.4	0.0	37.9	Nil
	8336.5	0.0	5.4	0.0	36.1	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

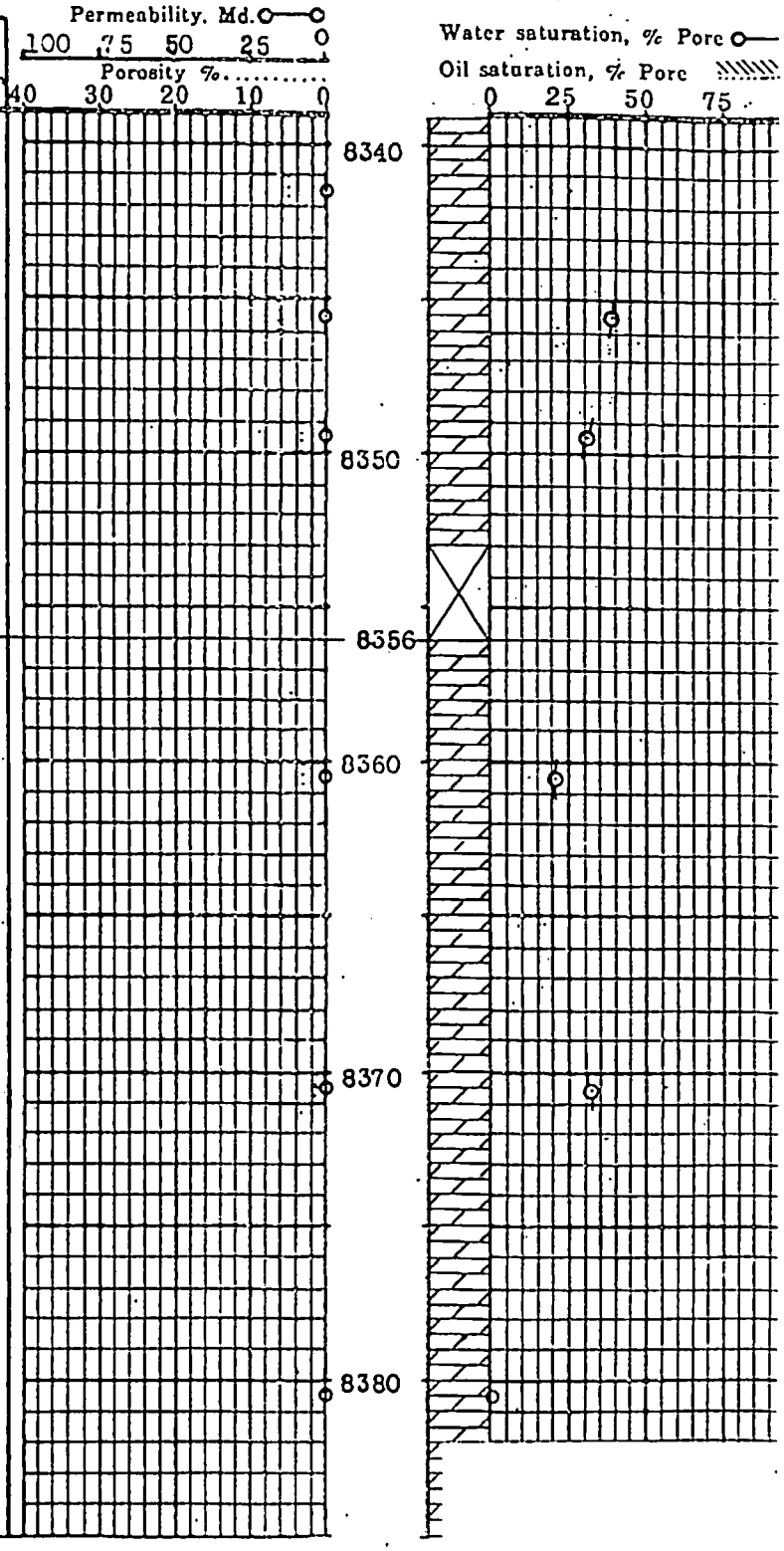
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... _____ Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 62 (Cont) # 63 (8356-8408')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8341.5	0.0	4.9	0.0	25.8	Nil
	8345.6	0.0	6.1	0.0	39.3	Nil
	8349.5	0.0	3.8	0.0	31.6	Nil
	8360.5	0.0	3.3	0.0	21.8	Nil
	8370.5	0.0	1.9	0.0	32.1	Nil
	8380.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

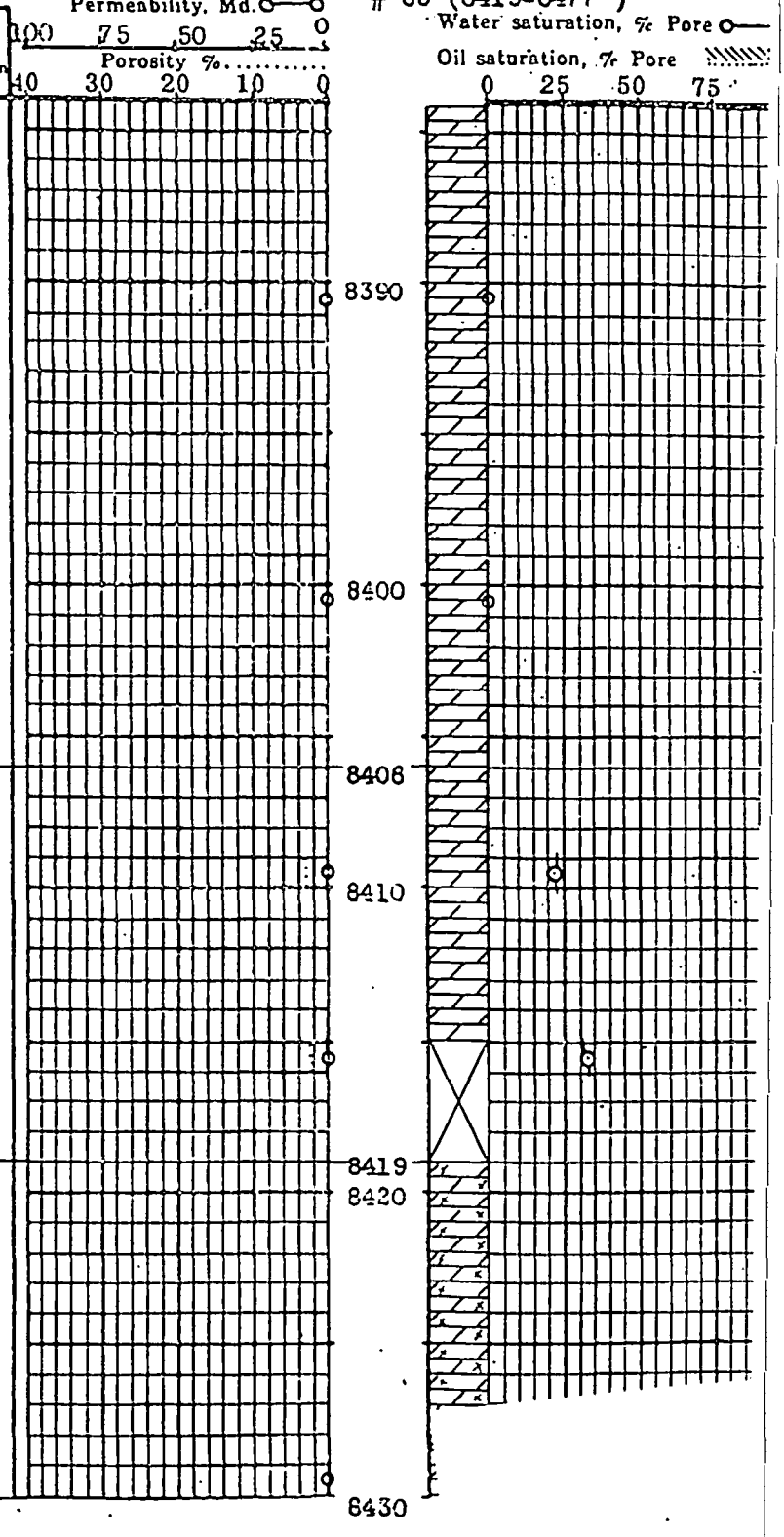
Well EAST POPLAR UNIT # 1 Legend: Sand ..... Dolomite ..... Eng. _____

Field _____ Shale ..... Anhydrite ..... Unit _____

County _____ State _____ Lime ..... _____

Remarks Core # 63 (Cont)# 64 (8406-8419') # 65 (8419-8477')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8390.5	0.0	0.0	0.0	0.0	Nil
	8400.5	0.0	0.0	0.0	0.0	Nil
	8409.5	0.0	3.2	0.0	22.5	Nil
	8415.5	0.0	2.2	0.0	33.7	Nil
	8429.5	0.0	0.0	0.0	0.0	Nil



THI HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

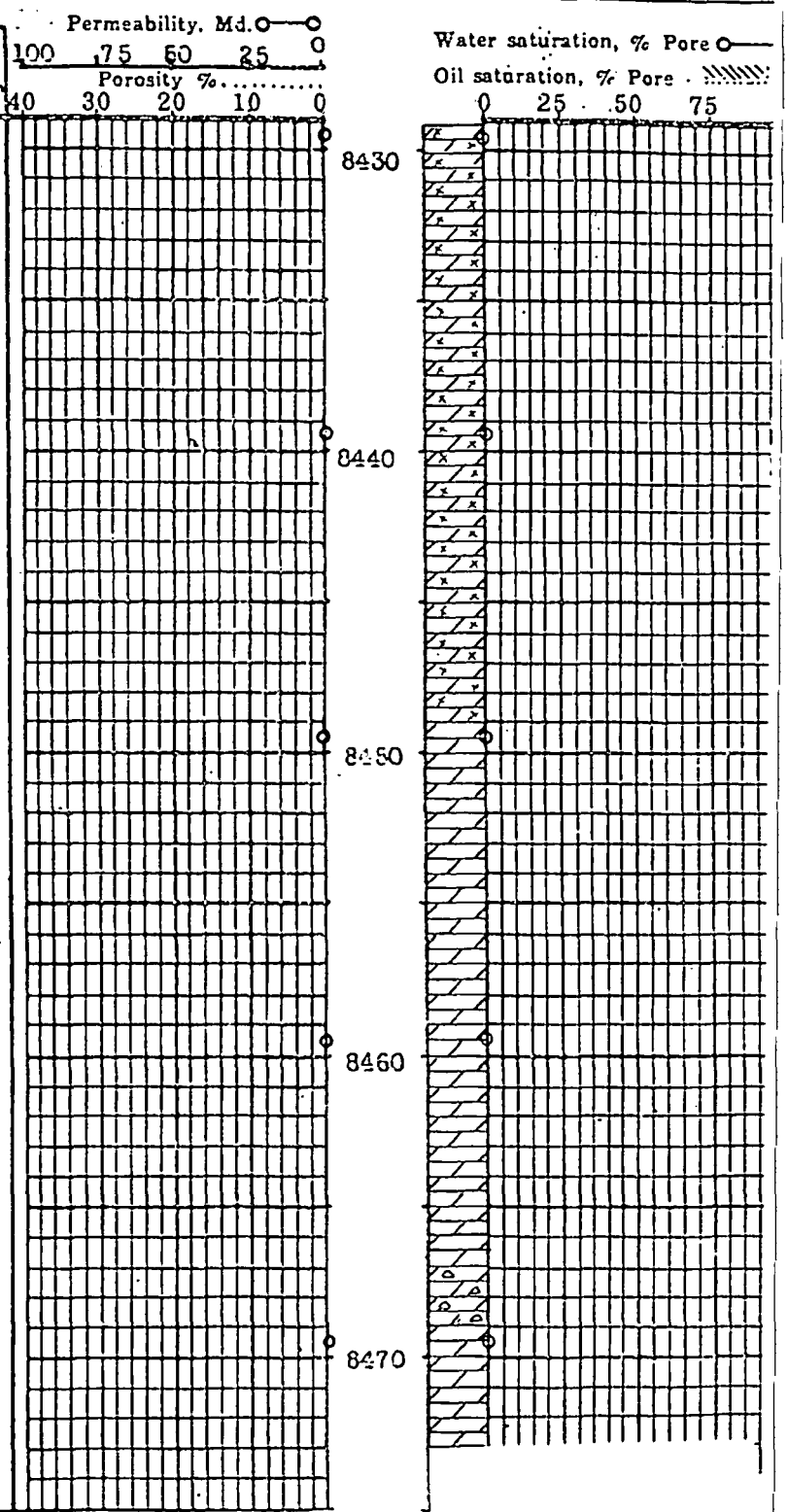
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

County _____ State _____ Lime..... Chert.....

Remarks Core # 65 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8429.5	0.0	0.0	0.0	0.0	Nil
	8439.5	0.0	0.0	0.0	0.0	Nil
	8449.5	0.0	0.0	0.0	0.0	Nil
	8459.5	0.0	0.0	0.0	0.0	Nil
	8469.5	0.0	0.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

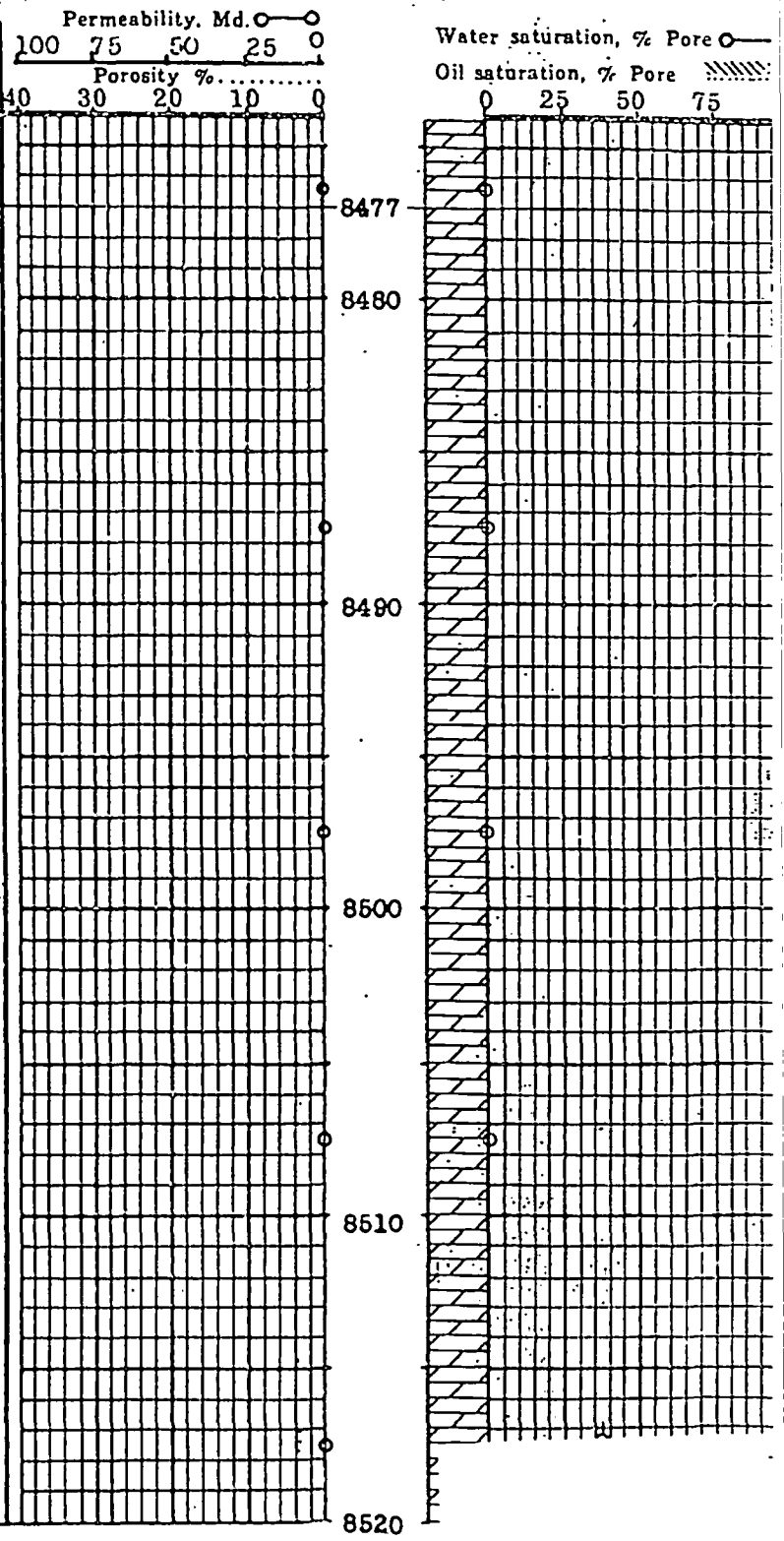
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite.... Eng. _____

Field _____ Shale..... _____ Unit _____

Lime.....

County _____ State _____ Remarks Core # 65 (Cont) # 66 (8477-8535')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8476.5	0.0	0.0	0.0	0.0	Nil
	8487.5	0.0	0.0	0.0	0.0	Nil
	8497.5	0.0	0.0	0.0	0.0	Nil
	8507.5	0.0	0.0	0.0	0.0	Nil
	8517.5	0.0	3.9	0.0	38.5	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

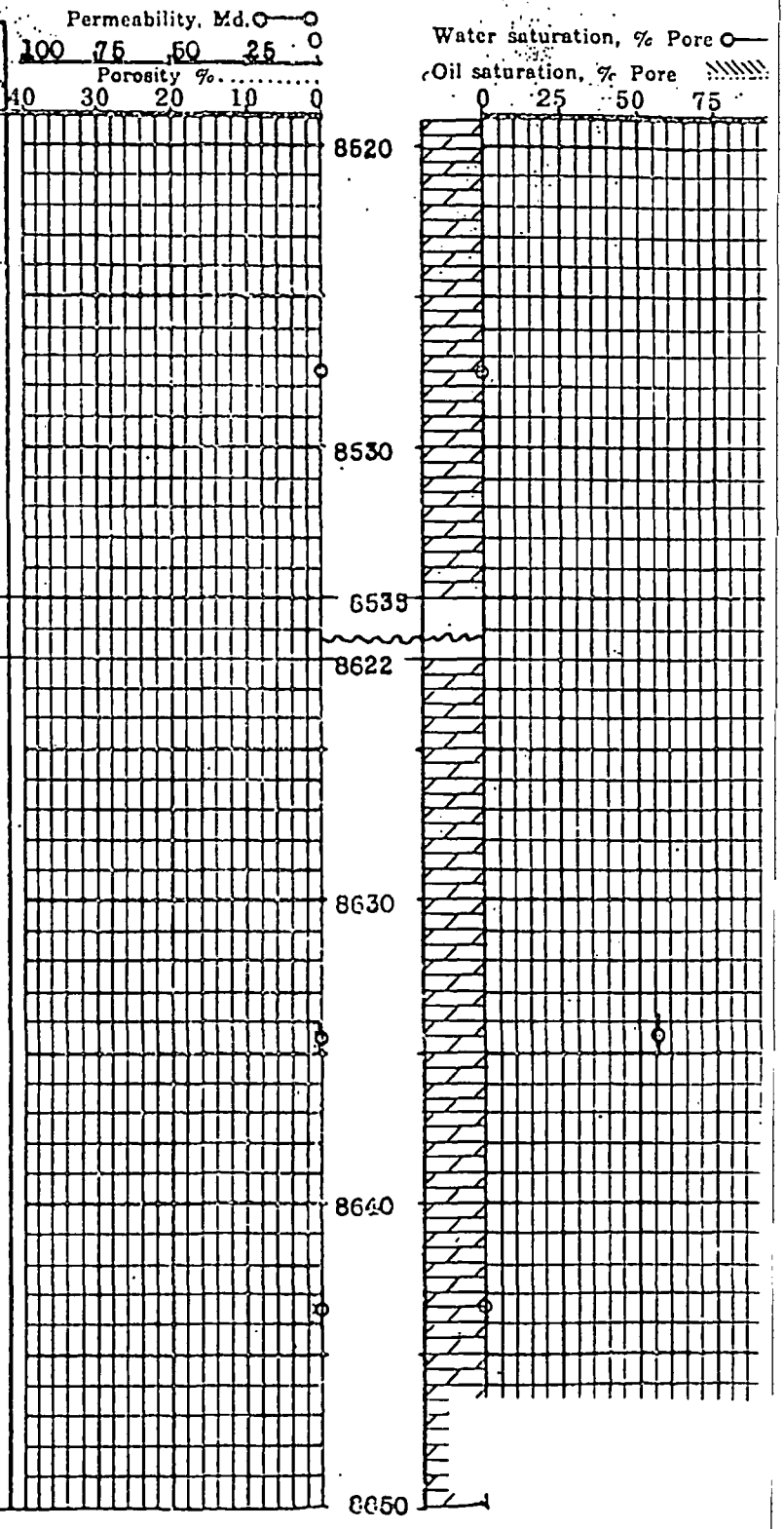
Company C. H. MURPHY JR. ET AL Location File

Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng.

Field Shale..... Unit

County State Lime..... Remarks Core # 66 (Cont) # 70 (8622-8680')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8527.5	0.0	0.0	0.0	0.0	Nil
	8634.5	0.0	1.1	0.0	56.2	Nil
	8643.5	0.0	1.8	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

Lime.....

County _____ State _____ Remarks Core # 70 (Cont) # 72 (8686-8737')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8654.5	0.0	1.1	0.0	0.0	Nil
	8659.5	0.0	1.2	0.0	53.4	Nil

Permeability, Md. 100 75 50 25 0

Porosity %..... 40 30 20 10 0

Water saturation, % Pore

Oil saturation, % Pore 0 25 50 75

8650

8660

8670

8680

8686

8690

THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

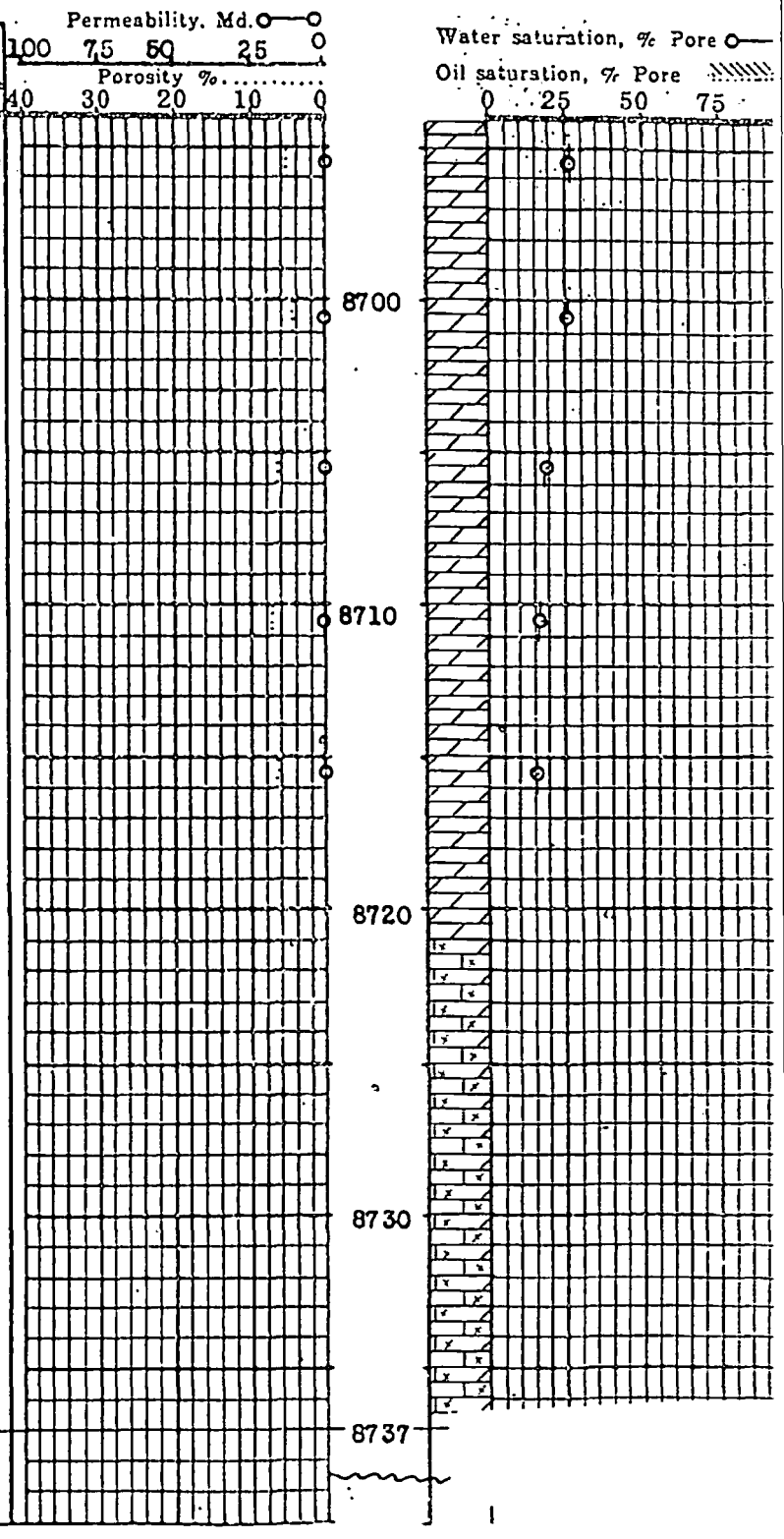
Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Field _____ Shale..... Anhydrite..... Unit _____

County _____ State _____ Lime..... _____

Remarks Core # 72 (Cont)

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8695.5	0.0	5.7	0.0	26.4	Nil
	8700.5	0.0	4.6	0.0	25.5	Nil
	8705.5	0.0	6.6	0.0	19.1	Nil
	8710.5	0.0	7.3	0.0	17.3	Nil
	8715.5	0.0	6.6	0.0	16.8	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

Well EAST POPLAR UNIT # 1 Legend: Sand..... Dolomite..... Eng. _____

Shale..... Anhydrite.....

Field _____ Lime..... Quartzite..... Unit _____

County _____ State _____ Remarks Core # 75 (8846-8873')# 79 (9047-9055')

Core # 84 (9102-9109')

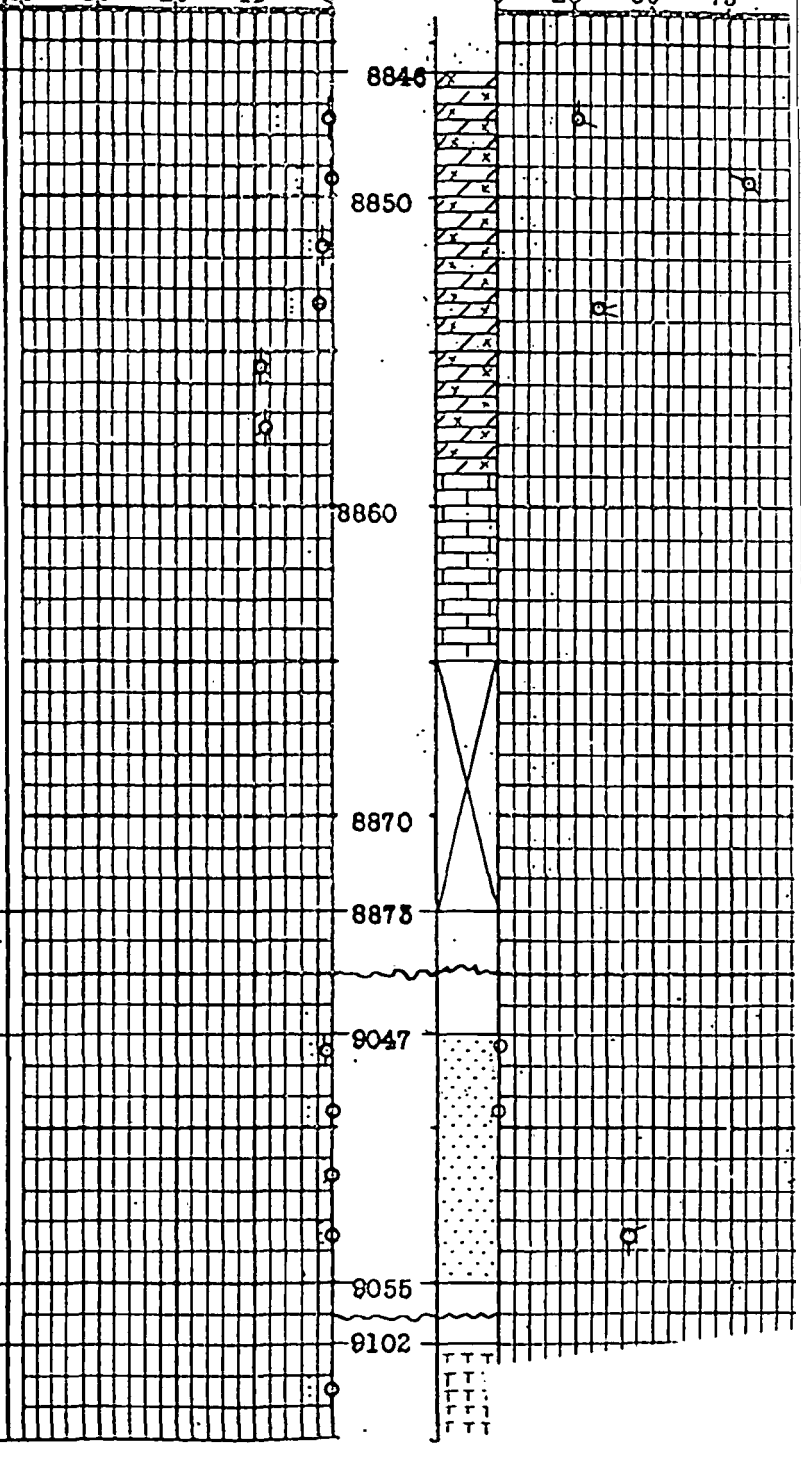
Permeability, Md. 100 75 50 25 0

Porosity %..... 40 30 20 10 0

Water saturation, % Pore

Oil saturation, % Pore 0 25 50 75

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	8847.5	0.0	7.1	0.0	26.8	Nil
	8849.5	0.0	4.5	0.0	81.4	Nil
	8851.5	3.9	3.0	0.0	100.0	Water
	8853.5	4.4	5.5	0.0	33.7	Water
	8856.5	23.0	8.2	0.0	100.0	Water
	8857.5	21.0	9.9	0.0	100.0	Water
	9047.5	1.1	2.4	0.0	0.0	Nil
	9049.5	0.0	3.6	0.0	0.0	Nil
	9051.5	0.0	1.0	0.0	100.0	Nil
	9053.5	0.0	1.9	0.0	43.7	Nil
	9103.5	0.0	3.0	0.0	0.0	Nil



THE HYCALOG COMPANY

CORE ANALYSIS REPORT

Company C. H. MURPHY JR. ET AL Location _____ File _____

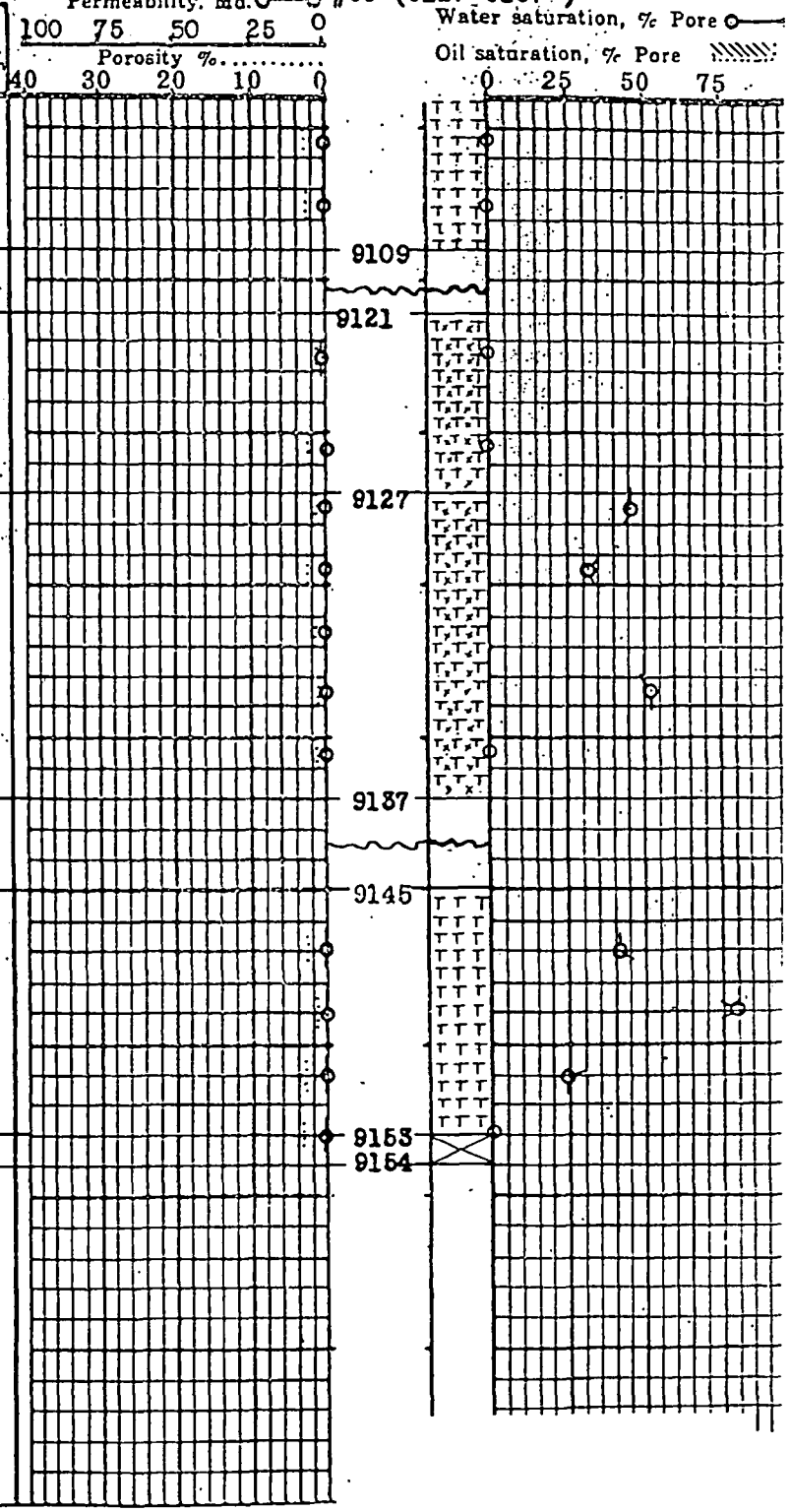
Well EAST POPLAR UNIT # 1 Legend: Sand..... Anhydrite..... Eng. _____

Field _____ Shale..... Quartzite..... Unit _____

County _____ State _____ Lime.....

Remarks Core # 84 (Cont) # 88 (9121-9127') # 89 (9127-9137')

Drilling Time Min/Ft.	Depth Feet	Permeability Millidarcys	Porosity Percent	Residual Saturation Percent Pore Space Oil	Residual Saturation Percent Pore Space Water	Probable Production
	9105.5	0.0	3.0	0.0	0.0	Nil
	9107.5	0.0	2.3	0.0	0.0	Nil
	9122.5	0.9	1.7	0.0	0.0	Nil
	9125.5	0.0	2.4	0.0	0.0	Nil
	9127.5	0.0	1.3	0.0	45.7	Nil
	9129.5	0.0	2.3	0.0	31.7	Nil
	9131.5	0.0	1.7	0.0	0.0	Nil
	9133.5	0.0	1.3	0.0	52.4	Nil
	9135.5	0.0	1.5	0.0	0.0	Nil
	9146-48	0.0	2.3	0.0	42.5	Nil
	9148-50	0.0	1.8	0.0	80.0	Nil
	9150-52	0.0	2.9	0.0	25.0	Nil
	9152-54	0.0	3.3	0.0	0.0	Nil



SERVICE & TESTING

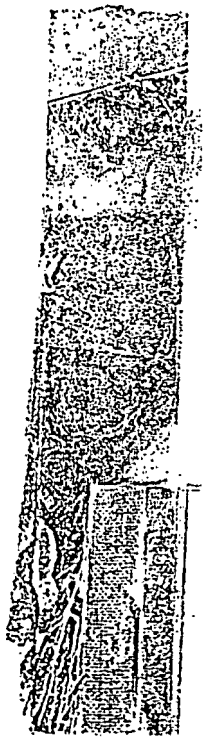
S + T / Epn #1

11 pages
37
48 pages

48 pages

1956 - 1960

WORKOVER NO. 1



WORKOVER HISTORY NO. 1

Date May 2, 1956

Lease and Well No. East Poplar Unit Well No. 1

Field East Poplar Unit County Roosevelt State Montana

Well Location SW NE Section 2, T28N, R51E.

Status prior to present job:
Date Completed: March 10, 1952 Date Last Workover None TD 9163'
PBTD 5687' Producing Zone: "B1", "B2", & "C" zone of Madison Formation
Perforations: "B1 & 2" 5648-80' w/4 jet S.P.F., "C" 5799-5814 w/6 BPF
Cumulative Production "B1 & 2" 68,010 net bbls oil; "C" 70,709 net bbls oil.
Latest test: "B1 & 2" 57 BOPD w/no water

Justification for Workover:

1. Repair leak close to the top of the 7" casing.
2. Run dual tubing strings and install a pumping unit so that the B1 & 2 zone can be pumped co-mingled while the C zone is flowing in order to increase the fluid production from the B1 & 2 zones.

Summary of Workover:

3-19-56: PBTD 5827'. Moved in and rigged pulling unit for emergency workover.

3-20-56: PBTD 5827'. Pulled stringer out. Model "D" production packer flopper valve would not hold. Circulated with salt water. Water would not hold C zone.

3-21-56: PBTD 5827'. Killed well with 10# salt water. Found leak in 7" casing 6 to 8' below well head.

3-22-56: PBTD 5827'. Circulated through leak in 7" casing out 13 3/8" casing. Hooked exhaust from rig motor into 7" and circulated out 13 3/8" casing. Cut window in 13 3/8" surface pipe and welded patch over leak. Pressured up to 600# on 7" casing, patch held o.k. Welded up window in 13 3/8" surface pipe and tested with 200# psi, held o.k.

3-23-56: PBTD 5827'. Layed down 2 7/8" tubing. Started running 2 3/8" tubing in order to be able to run 2 strings in 7" casing so that the B1 & 2 zones can be pumped and the C zone can be flowed.

3-24-56: PBTD 5827'. Finished picking up 2 3/8" tubing, washed out 60' salt on top of packer, displaced water with oil. Shut in overnight.

3-25-56: PBTD 5827'. Flowed C zone o.k. Tested for communication, seal rings and packer. Held o.k. Pulled Otis side door choke, ran Otis seperation tool. Blanked off C zone, started swabbing B1 & 2 zones. Swabbed 20% salt water. Fluid level 1400' from top. Let set over night. Would not flow.

Workover History No. 1 Continued

3-26-56: PBTD 5827'. Swabbed B1 & 2 zone at rate of 27 BFPH, 30% water. Ran 2 jts (40') 1" pipe between 13 3/8" surface casing and 7" casing to cement any future leak. A 1" plug valve is located 3' below head on west side of well. Released pulling unit 12:01 P.M., 3-26-56.

3-27-56: PBTD 5827'. Waiting on material to run dual strings of tubing with pulling unit.

3-27-56: PBTD 5827'. Pulled Otis separation tool. Ran Otis side door choke. Flowing C zone.

Temporarily dropped from Report.

4-28-56: PBTD 5827'. Rigged up pulling unit.

4-29-56: PBTD 5827'. Pulled Otis side door choke, ran Otis seperation tool. Circulated out with 9.3# salt water. Well would still not flow. Pulled separation tool and ran side door choke. Checked for communication with pump pressure. No communication indicated. Re-ran seperation tool. Let "B" zones flow overnight. Shut in pressure on B zones loaded with water is 200#.

4-30-56: PBTD 5827'. Opened B zones to test tank, still flowing small stream. Circulated out with water. Ran second string of tubing in well with turned down, beveled N-80 collars. Hooked up dual tubing head and closed well in.

5-1-56: PBTD 5827'. Preparing to set pumping unit to pump "B" zones.

5-2-56: PBTD 5827'. Pulled Otis seperation tool. Ran Otis side door choke. Flowing "C" zone through one string of tubing.
Dropped from report.

Results of Workover:

1. The leak in the 7" casing was repaired and 40' of 1" pipe was run in the annulus of the 7" and 13 3/8" casing in order that any future leaks can be cemented.

2. Fluid production of the B1 & 2 zones was increased from 57 BFPD with no water to 240 BFPD with 1% water.

Final Summary of Workover:

1. Perforations: B1 & 2 5648-5680 (unchanged)
   C zone 5799-5814 (unchanged)
2. PBTD: - 5827' (unchanged)
3. Initial Potential: W. O. 240 BFPD with 1% water. (B1 & 2 zones)
4. Down hole equipment:

Workover History No. 1 continued

Tubing Record for "C" zone:

Top Joint	30.66
Pup joint, 10' - 4' - 6'	20.11
186 jts 2 3/8" EUE tbg.	5685.15
Total tubing	5735.92
Below RKB	11.20
2" collar and 2" x 2 1/2" swedge	.76
Otis Flow nipple	2.12
Bottom of tubing	5750.00
Baker Seal nipple and loc. sub	3.08
Tail Pipe	7.92
Total bottom of tubing	5761.00

Tubing Record for "B1 & 2" zones:

Below RKB	11.20
Top joint	31.13
182 jts 2 3/8" w/turned down, beveled N-80 collars	5591.43
Perf. top 4' of jt.	28.20
Total	5661.96

Seating Nipple 1 25/32" 114 jts down at 3450'.

1 - 1 - 25/32" seating nipple spaced 114 jts down.

Rod record:

1 - 3/4" scraper sub (Huber)	
38 - 3/4" scraper rods (Huber)	950'
20 - 3/4" plain rods (Type X)	500'
80 - 5/8" plain rods (Type X)	2000'

Pump - 2" x 1 1/2" x 16'6" with 5' cast iron plunger National insert pump.

5. Well Head Equipment:

Head - 13 3/8" O.D. x 12" Ser 900 Type C-18 OCT casing w/2-2" outlets.
Hanger - 13 3/8" O.D. x 7" O.D. C-18 casing.
Valve - 2" 6000# test WKM FE Gate

Hanger - 6" Ser 900 x 2 3/8" x 2 3/8" Cameron dual type tubing head.

1. 2 3/8" 600 Ser. 4000# test special master Gate valve for dual completion (C-zone).
1. 2 3/8" OCT Adjustable choke (C zone).

6. Surface Equipment:

1 - T17C1-D160Z American pumping unit complete with frame extension, and ground lubrication system. Ser No. D 160 720.
1 - 30 H.P. General Electric 3 phase 60 cycle 220/440 volt splash-proof electric motor with rodent screen protection.
1 - General electric Type CR - 7008E Size No. 3 motor control.

78

RECEIVED
JAN 7 - 1960
OIL & GAS CONSERVATION COMMISSION OF THE STATE OF MONTANA

WORKOVER HISTORY NO. 2

December 2, 1959

Lease and Well East Poplar Unit Well No. 1 Field East Poplar

County Roosevelt State Montana Well Location SW NE Sec. 2, T28N, R51E

Status Prior to Present Job:

Date Completed March 10, 1952 Date Last Workover May 2, 1956 TD 9263

PBTD 5827 Producing zone B & C zone of Madison Formation

Perforations B 5648-5680; C 5799-5814. Cumulative Production B zone 209,105 BO, C 127,570 BO. Latest Test Pumping B zones co-mingled, 52 BOPD, 21 BWPD 28% Water, Flowing C zone 23 BOPD, 440 BWPD, 95% water.

Justification for Workover:

To repair leak from C zone to B zone when C zone shut in, check dual strings of tubing for damage, increase production and lower water cut.

Summary of Workover: See Attached summary of workover

Recap of Workover:

Final Perforations A zone 5524-5530, C zone 5799-5827

Final PBTD 5827

Initial Potential after Workover C zone, flowing on P-36 choke, 217 BFPD 70% water. (65 BOPD, 152 BWPD) A zone, Pumping 293 BFPD, 71% water, (86 BOPD, 208 BWPD)

Geologic Name of Producing zone A and C zones of Madison formation.

		C zone	A zone
Tubing Record	Below RKB	11.00	11.00
	Top Joint	30.49	1.08 (Seating Nip.)
	Subs	16.04	3.13
	2-3/8" tubing	(187) 5672.49	(180) 5529.78
	Choke nipple	.80	
	Latch on Sub	.68	
	Seal Assemblies	2.74	
	Stinger	31.00	30.90
	Bottom of Tubing	5765.24	5575.89

Rod Record 132- 5/8" plain rods 3300' 8' & 4' subs
48- 3/4" plain rods 1200'
39- 3/4" scrapers 975'

Combined production increased from 75 BOPD to 151 BOPD. Leak Csg. repaired. W.O. Succ Workover Successful.

SUMMARY OF WORKOVER

7-29-59 PBTD 5827'. Pulling tubing. Mixed mud and killed well.

7-30-59 PBTD 5827'. Pulled B zone tubing, installed BOP. Pulled C zone tubing. Both strings of tubing in good condition except for 6 crooked joints on bottom. Ran Baker junk basket on swab line. Started in hole with Halliburton RTTS Packer.

7-31-59 PBTD 5827'. Conditioned mud and broke circulation. Ran Halliburton packer, set between B & C zone. Packer would not hold. Set packer above B zone to test casing above. Would not hold. Dropped ball and pressure tested tubing with 1700#. Held OK. Pulled tubing to check pkr.

8-1-59 PBTD 5827'. Ran tubing with Baker full bore packer, set between B and C zones. Press. up on csg. to 750#. Held OK. Indicating no communication outside pipe and that csg. was good. Pulled tbg. Ran Baker junk basket on wireline. Set Model D packer on wireline, set at 5745. Ran 4,000' of tbg. with Baker seal assy. and 65' tail pipe. Displaced mud w/ water.

8-2-59 PBTD 5827'. Tested for communication with 1100# on casing. Held OK. Flowed C zone to pit until clean. Circ. hole with oil, tested for communication with 1100# on csg. Held Ok. Formation broke at 1100#. Pumped 5 gal MOROflow mixed w/ 5 bbls. oil. Squeezed C zone 5799-5827 with 50 sax cmt. mixed with diesel oil, squeezed 44 sax cmt. into formation at 1800#. Reversed 6 sax cmt. to pit. Bottom of tail pipe at 5809.

8-3-59 PBTD 5827'. Flowed C zone for 6 hrs. (80% water). Displaced water with oil. DOC Squeeze # 2 C zone 5799 to 5827 with 50 sax reg. cmt. mixed with diesel oil. Broke formation with 1100#. Pumped 5 gals HYFLO with 5 bbls oil ahead slurry. Squeezed 22 sax cmt. out in formation, maximum pressure 2200#. Reversed out 28 sax cmt. Cleaned perf w/ 1.5 bbls of oil @ 1900#. 2 min. bleed down 1500#. Let cmt. set overnight 16½ hrs.

8-4-59 PBTD 5827'. Opened well to test tank. Flowed 36 BOPD, 174 BWPD, 83% water.

8-5-59 PBTD 5827'. Flow tested 51 BOPD, 458 BWPD, 90% water.

8-6-59 PBTD 5827'. Tripped tbg. to remove Baker seal assy. and pick up full bore packer and DR plug. Tested DR plug w/ 750#. Held OK. Set packer above B zones & swab to pit 4 hrs, 65% water.

8-9-59 PBTD 5827'. Acidized B perforations 5648 to 5680 with 1500 Gals. Haliburton HV acid. Spot acid down tbg. Injected 1st 12 bbls. acid @ rate of 2 BPM @ 2000 #psi. Last 2½ bbls. @ rate of 4.5 BPM @ 2500 #psi. Bleed down pressure zero. Let acid set on formation 2 hrs. Swabbed 2 hrs. to pit, rec. spent acid and water and oil. Swabbed 657 BFPD, 85% water. (99BOPD, 558 BWPD). Chlorides b zone 94,000 PPM.

Laid down C zone tbg. string. Ran B zone rods, tbg and pump.

8-10-59 to
8-24-59 5827' PBTD. Pump tested. Last test 2 hrs. Pumped 325 BFPD, 96% water. (312 BWPD, 13 BOPD)

8-25-59 PBTD 5827'. Pulled tbg. Ran Baker full bore packer in hole. Tested tbg. and DR plug in packer at 5750' with 2200 #, held OK. Spotted aprox. 3 bbls of gel on top of DR plug. Pulled up. Broke formation with 1400# at 5 BPM. Displaced csg. and tbg. with oil. BOC Squeeze B perfs. 5648-5680 with 75 sax reg. cement with 5 bbls. diesel oil ahead, 3 behind. Displaced 6½ bbls. (33 sax) in formation at 1200 lbs. Pressure started increasing, changed gears on pump truck. Flash squeezed, pressure went to 2800 lbs. Csg. and tbg. communicated, reversed out 1½ bbls cement and diesel flag. Over rev. 70 bbls., pulled packer. Found split joint at 3447'. Joint split from rod wear. 8 bbls. cement in csg. should have 225' cement fillup.

8-26-59 PBTD 5827'. Picked up C-zone 2-3/8" tbg. to circulate and drill out cement from BOC squeeze. Picked up 177 joints, 5414', and reversed circ. Found scattered stringers of cmt. approximately 3000' to 5614'. Found firm cement from 5614' to 5616'. Washed through bridge OK. Aprox. 5 bbls. of cement reversed out of hole. Pulled 6 stands out of hole and shut down overnight.

8-27-59 PBTD 5827'. Went in hole with 6½" bit. Started reversing cmt. at 5620. Found firm cement at 5638. Could not wash through. Drilled with power swivel from 5638 to 5740. Firm cement as follows: 5638 to 5646, 5652 to 5661, and 5664 to 5675. From 5689 to 5740 cmt. appeared to slide down hole. Tagged top of DR plug at 5746. Reversed circ. from 2:30 PM to 5:30 PM and started out of hole.

8-28-59 PBTD 5827'. Ran tbg. with Baker full bore packer. Set packer and test DR plug with 1400 lbs. Held OK. Reset packer at 5635 and swabbed B 5648 to 5680. Swabbed dry. Let set 1 hr, made run with swab, rec. 3 BF, 100% oil. Swabbed 3 more hrs. at rate of 18 BOPD, no wtr.

8-29-59 to
8-31-59 PBTD 5827'. Swab tested. Last test, 12 BFPD, 60% water. (5 BOPD, 7 BWPD). Pulled tbg. Ran Lane Wells Gamma Ray Neutron Chlorimilog from 5741.5 to 4500. Two inch Gamma Ray Neutron from 4500 to 3000. Perf. B zone from 5687 to 5691 with Lane Wells E-gun, 6 holes per ft.

9-1-59 PBTD 5827'. Ran tbg. with Baker full bore packer. Set packer at 5722. Test DR plug with 1000 lbs. Held OK. Set packer at 5683 and check for communication between B perf. No communication. Swabbed B zone 5687-5691. Swabbed at rate of 108 BFPD, 95% water. (5 BOPD, 103 BWPD). Acidized B zone 5687-5691 with 500 gals. HCECO reg. acid. Acid feeding very slowly at 1500 lbs. Formation broke with 3 bbls. acid in. Inj. remainder of acid at rate of 4 bbls. per min. at 1000 lbs. No indication that zones communicated. Swabbed spent acid, oil and water.

9-2-59 PBTD 5827'. Swabbed at rate of 593 BFPD, 97% water. (18 BOPD, 575 BWPD).

9-3-59 PBTD 5630'. Test DR plug with 3000 lbs. Held OK. Squeeze B-1 zone, 5645 to 5680 and B-2 zone 5687 to 5691 with 50 sax reg. cement with HOWCO retarder added. Broke formation with ½ bbls. water to 2000 lbs. Squeezed 50 sax cement cut in formation. Max. press. 2600#. Would not hold. Cleared tool and let set 4 hrs. Squeeze No. 2, 50 sax reg. cement with HOWCO retarder added. Broke formation with ½ bbls. water at 2600#. Squeezed 30 sax cement out in formation. Max. pressure 3800#. Held OK. Left 2.5 sax cement in csg. Reversed out 17.5 sax cement.

9-4-59 PBTD 5630'. Tested squeeze with 3000#. Held OK. Made trip with tbg. to remove packer.

9-5-59 to
9-9-59 PBTD 5630'. Waiting on pulling unit.

9-10-59 PBTD 5827'. Pulled rods and tbg. Ran tbg with bit and rigged up power swivel. Drilled cement from 5630 to 5736, then dropped through 6' to top of DR plug at 5742. Circ. 3 hrs. Test squeeze with 1100#, Held OK. (Bottom of B-2 perf. 5691', hard cement to 5736.)

9-11-59 PBTD 5827' Pulled tbg, and perforated B-1 zone 5714 to 5724 with Wire-Line and Keratless csg. gun, ½ SPF. Ran tbg. with Baker full bore pkr. set at 5712, then swabbed tbg. dry. Made dry run every 30 minutes until acid truck arrived. Tested casing, BOP and pkr with 1000#, Held OK. Acidized B-1 perforations 5714-5724 with 500 gls. HOWCO 15% reg. added. Acid started feeding at 2200 #. Inj. 3 bbls. at rate of ¼ BPM @ 2200#. Formation then broke to 2000#. Inj. remainder of acid at rate of 3 BPM at 2600#. Bleed down pressure to 1800#. Opened to pit, swabbed spent acid with trace of oil. Swabbed dry before acid was recovered.

9-12-59 PBTD 5827'. Swabbed B-1 zones, 95% water. Tested casing and BOP with 1000#, held momentarily then gave away. Moved pkr. above B-1 perfs. and tested with 1000#, held OK. Set pkr. below B-1 perfs. and pressured up to 1000# on tbg. Held OK. Reset pkr. between B-1 perfs. and attempted to press. up on csg. Would not hold. Reset packer at various intervals between B-1 perfs. Communicated each time. Reset packer above B-1 zone and press. up to 1000# on casing. Held OK. Indicated B-1 perfs. still squeezed off and that communication is outside the pipe between B-1 perfs.

9-13-59 PBTD 5827'. Set packer at 5686 and swabbed B-1 perforations. Swabbed tbg. dry. Swabbed 2 hrs. and recovered approx. 5 gals. fluid per hr. Acidized B-1 zone 5687 to 5691 and B-2 zone 5714 to 5724 with 1500 gals. HOWCO HV acid. Injected 2 bbls. at rate of ½ BPM at 2000#. Next 3 bbls. at rate of 1 BPM at 2000#. Next 8 bbls. at rate of 2 BPM at 2000#. Remainder of acid at rate of 4 BPM at 2100#. Bleed down pressure to 0#. Swabbed spent acid water and oil. Last two hours swabbed at rate of 744 BFPD, 98% water. (15 BOPD and 719 BWPD).

9-14-59 PBTD 5641.5'. Test DR plug with 3000#, held OK. Set pkr. at 5645. Squeezed B-2 zone 5687 to 5691 and B-1 zone 5714 to 5724 with 65 sax reg. cement, HOWCO retarder added. Broke formation with 5 bbls. wtr.

9-14-59 PBTD 5641.5' (Cont'd.) @ 1600#. Packer gave way 45 sax out in form. cleared tool with water. Let set 3 hrs. Squeeze No. 2, B and B with 65 sax reg. cement, HOWCO retarder added. Broke formation with 5 bbls. water at 1800#. Squeezed 30 sax in csg. Reversed out 20 sax, top of cement at 5641.5. Made trip with tbg. to remove packer and pick up bit.

9-15-59 PBTD 5686.5 Rigged up power swivel and drilled 45' of hard cement. Power swivel broke down.

9-16-59 PBTD 5827'. Repaired power swivel and drilled out 51.5' of hard cmt. Total hard cement 96.5'. Note: Cement again lower than bottom perf. 5714. Last 4' to DR plug seem to have cement strung down. Drilled off very fast. Circ. 3 hrs. to clean hole.

9-17-59 PBTD 5827'. Pulled tbg. and bit out of hole. Ran Baker retrievable Bridge plug on bottom of full bore packer. Set plug at 5730. Pulled up 3 joints and set full bore packer and tested squeeze job on old perforations. Tested with 2400#. Held OK. Latched on to bridge plug and reset at 5640. Pulled out 3 stands and Perforated A zone from 5524 to 5530. Picked up 1 stand and set packer at 5520'. Started swabbing at 4 PM. Had live oil on 5th run with swab. Swabbed to pit approximately 60 bbls of fluid in 2 hrs, 20 to 30 percent oil.

9-18-59 PBTD 5827'. Released packer, ran in 2 stands and picked up retreivable bridge plug. Pulled tbg out but did not have bridge plug. Started in hole with tubing.

9-19-59 PBTD 5827', Ran tbg and rods and started well pumping.

9-20-59 to
10-1-59 PBTD 5827'. Pump tested. Last test 47 BOPD, 261 BWPD. Temporarily dropped from report.

10-26-59 PBTD 5827'. Last test 362 BFPD, 8% water. (58 BOPD, 304 BWPD). Pulled rods.

10-27-59 PBTD 5827'. Ran Baker full bore packer with retrievable bridge plug. Set bridge plug at 5617. Tested with 300#. Spotted 1 sack gel on top of bridge plug. Set packer at 5521. Broke formation with 2800#. Displaced water with oil and DCC squeezed the A zone perforations 5524 to 5530 with 60 sax Ideal regular cement with 5 gals. Hyflo mixed in 5 bbls. ahead. Maximum squeeze pressure 3200# with 36 sax cement in formation. Reversed out 25 sax, washed through and cleared perforations with 1.5 bbls. oil at 3200#. Broke back to 3050#. Job complete at 6:00 PM, 10-27-59.

10-28-59 PBTD 5827'. Set Baker full bore packer at 5500'. and started swabbing A zone 5524 to 5530. Swabbed tbg. dry. Made run with swab every 30 minutes for 2 hrs. Recovered approximately 1/3 bbl. fluid each run, no water. DCC in each sample. Third hour recovered no fluid. Overnight fillup, 1700' in tbg. (1000' oil and 700' water. Chl. 55,000 PPM.

10-29-59 PBTD 5827'. Swabbed A zone 4 hrs. recovering very small amount of wtr. Treated A zone 5524 to 5530 with 250 gals. 7.5% HOWCO MCA. Soaked acid for 2 hrs. keeping pressure at 2000#. Inj. 1.75 bbls. in formation. Released and flowed back. Inj. 3 bbls. at ¼ BPM at 3000#. Flowed back then injected remainder of MCA at rate of ¼ BPM at 3000#. Flowed back, then inj. same back into formation at rate of ½ BPM at 3000# Let set 30 min. Swabbed one hr. and tbg. was dry. Made one dry run, then shut in on account of darkness.

10-30-59 PBTD 5827' Overnight fillup 1100', 100% water. Acidized A zone 5524 to 5530 with 500 gals., 15% reg. acid. Acid started feeding at 2400#. Inj. 2 bbls. acid at rate of ¼ BPM at 2400#. Formation then broke back to 2200#. Inj. 4 more bbls. at rate of ¼ BPM at 2000#. Increased pump rate of ½ BPM, inj 5 bbls at 2400# then formation broke back to 2000#. Stopped acid with 11 bbls, in formation. Opened to pit. Spent acid to surface in 19 minutes. Flowed to pit 30 min. to clean up. Water cut 50%. One hr. test on ¼" choke. Flowed at rate of 219 BFPD, 50% water, (109 BOPD, 110 BWPD) Tbg. flow press. 525#.

10-31-59 PBTD 5827'. Tested 3 hrs. 291 BFPD, 50% water. (145 BOPD, 146 BWPD).

11-1-59 PBTD 5827'. Mixed mud. Killed well with 10.2# mud. Released Baker full bore packer. Picked up 3 jts. tbg. Ran into bridge with 3rd jt. at 5700'. Picked up on tbg. and everything indicated that bridge plug was on tbg. Pulled 8 stands (480') swabbing casing as pulled. Valve in bridge plug evidently plugged with lost circulation material. Worked pipe 60' until tool quit swabbing casing. Came out of hole with tbg. and did not have bridge plug. Ran tbg. with retrieving head to fish DR plug. Unable to catch plug.

11-2-59 PBTD 5827'. Mixed mud and circ. hole. Turn tbg. with air tongs and circ. down to retrievable bridge plug. Pulled tbg. and removed bridge plug. and retrieving head. Ran tbg. with fishing tool to catch DR plug. Found btm 10' high (5732) according to tbg. measure.

11-3-59 PBTD 5827'. Rotated tbg. with air tongs and wash down to DR plug. Pulled tbg. to remove fishing tool and DR plug. Well started flowing while crew was making up Baker seal assy. and Otis choke nipple. Ran tbg. in hole to condition mud. Mixed 75 bbls. mud.

11-4-59 PBTD 5827'. Mixed and conditioned mud to 10.2# and killed well.

11-5-59 PBTD 5827'. Ran Baker seal assembly and Otis separation tool. Latched into packer at 5745. Spaced out and cut on tbg. head. Started in hole with second string, ran 20 jts., (650), pickup line caught under slips and dropped A zone string with turned down collars in hole. Attempted to release no left turn latch on sub, would not release.

11-6-59 PBTD 5827'. Ran Dia-Log free point indicator in C zone tbg., found tbg. free to 5721. Ran string shot and backed off at 5685. (two joints above packer) Pulled tbg. out of hole. Went in hole with HOWCO overshot and found fish at 5096'. Recovered fish.

11-7-59 PBTD 5827'. Went in hole with C zone tbg. and screwed into collar. Pulled 15,000# above weight of tbg. Packer mandrel broke. Pulled out of hole and recovered inside of packer with seal assy. Ran junk basket and set Baker Model D packer on wireline at 5731.5'.

11-8-59 PBTD 5827'. Ran C and A zone tbg. in hole and hooked up X-mas tree.

11-9-59 PBTD 5827'. Attempted to pull Otis blank off tool. Sheared disk and was unable to pull plug due to heavy mud plugging off and pressure would not equalize.

11-10-59 PBTD 5827'. Pressured up on C zone tbg. to equalize pressure 700# and pulled Otis blank off tool. Swabbed heavy mud and lost circulation material out of C zone and zone started flowing. Ran Otis side door choke. Displaced salt water with oil on A zone, zone started flowing. C zone tbg press. 700#. A zone tbg. press. 300#

11-11-59 PBTD 5827'. Chokes plugging on both A and C zones, no tests.

11-12-59 to
11-16-59 PBTD 5827'. Tested C zone. Last test, R-36 choke, flowed 217 BFPD 70% water. 65 BOPD, 152 BWPD. TFP-215#. Workover potential of C zone

11-17-59 to
12-2-59 PBTD 5827'. Tested A zone. Last test, pumping 293 BFPD, 71% water. 86 BOPD, 208 BWPD. Chlorides 115,000 PPM. Workover potential of A zone. To drop from report.

37 P

CHEMICAL & GEOLOGICAL LABORATORIES

CHEMISTS GEOLOGISTS ENGINEERS

P. O. BOX 279
CASPER, WYOMING

THE C. H. MURPHY JR., CORPORATION

WELL NO. 1 UNIT

C SW NE 2-28N-51E

MORRISON AND CHARLES SAND

EAST POPLAR, MONTANA

REPORT ON
SUB-SURFACE OIL SAMPLE
Bottom Hole Pressure Tests

BOTTOM HOLE PRESSURE SURVEY

E-386

Static Test

Date April 7 & 8, 1952

Company Murphy Corporation Field East Poplar Lease and Well No. EPU No. 1

Location C SW NE 2-28N-51E County Roosevelt State Montana

WELL DATA:

Elevation: 2135 DF / 2123 Ground Datum Point: 5799 Top Formation

Formation: Madison Perforation: 5799-5827

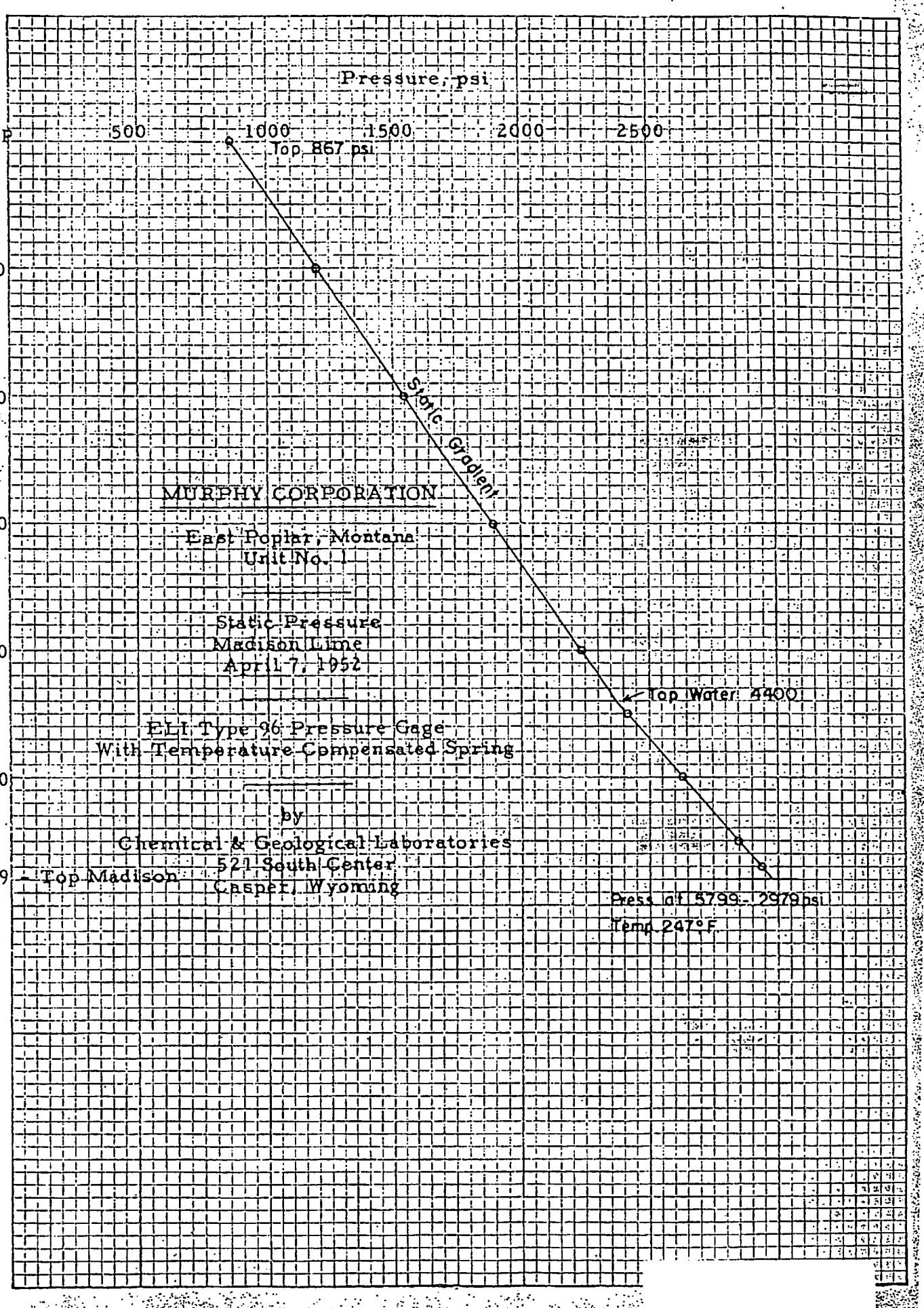
N.T.D.: 5827 Tubing Press: 870 psi

Casing: 7" @ 5814 Casing Press: - - -

Tubing: 2½" EUE @ 5750

Depths	Extension Inches	Pressure	Gradient #/100	Additional Information
Top Hole	1.065	867 psi	33.4	
1000	1.515	1202	34.5	
2000	1.980	1547	34.7	
3000	2.445	1894	34.7	
4000	2.910	2241	36.2	
4500	3.150	2418	43.4	
5000	3.440	2635	44.0	
5500	3.735	2855	40.5	
5700	3.845	2936		
5799		2979 (extrapolated)		

Remarks: Well Shut In. All measurements below D.F.
Temperature @ 5700 - 244°F.
Extrapolated to 5799 - 247°F.
Water found in diaphragm of bomb.


Pressure, psi
Top
500
1000
1500
2000
2500
Top 867 psi
1000
2000
3000
4000
5000
5799
Depth, feet
Static Gradient
MURPHY CORPORATION
East Poplar, Montana
Unit No. 1
Static Pressure
Madison Lime
April 7, 1952
Top Water 4400
ELI Type 96 Pressure Gage
With Temperature Compensated Spring
by
Chemical & Geological Laboratories
521 South Center
Casper, Wyoming
Top Madison
Press at 5799 - 2979psi
Temp 247°F

CLI-16
PRAIRIE PUBLISHING CO.—42083

BOTTOM HOLE PRESSURE SURVEY

Flowing Pressure

E-386

Date April 7 & 8, 1952

Company Murphy Corporation Field East Poplar Lease and Well No. E.P.U. No. 1

Location C SW NE 2-28N-51E County Roosevelt State Montana

WELL DATA:

Elevation: 2135 DF / 2123 Ground Datum Point: 5799 Top Formation

Formation: Madison Perforation: 5799-5827

N.T.D.: 5827 Tubing Press: 775 psi

Casing: 7" @ 5814 Casing Press: - - - -

Tubing: 2½" EUE @ 5750

Depths	Extension Inches	Pressure	Gradient #/100'	Additional Information
Top Hole	0.940	722 psi		
			35.8	
1000	1.420	1130		
			36.1	
2000	1.905	1491		
			36.9	
3000	2.400	1860		
			34.9	
4000	2.870	2209		
			34.2	
4500	3.100	2381		
			34.4	
5000	3.340	2558		
			35.2	
5500	3.575	2734		
			35.1	
5700	3.670	2805		
5799		2840 (extrapolated)		

Remarks: Well flowing on 10/64" choke @ 448 bbls. per day rate (last 2 hr. ave.).
Uncorrected gas volume - average last 2 hours - 6050 C.F. daily.
All measurements from D.F.

PRAIRIE PUBLISHING CO — 4 2003

BOTTOM HOLE PRESSURE SURVEY E-386

Flowing Pressure

Date April 7 & 8, 1952

Company Murphy Corporation Field East Poplar Lease and Well No. E.P.U. No. 1

Location C SW NE 2-28N-51E County Roosevelt State Montana

WELL DATA:

Elevation: 2135 DF / 2123 Ground Datum Point: 5799 Top Formation

Formation: Madison Perforation: 5799-5827

N.T.D.: 5827 Tubing Press: 835 psi

Casing: 7" @ 5814 Casing Press: - - - -

Tubing: @ 2½" EUE @ 5750

Depths	Extension Inches	Pressure	Gradient #/100	Additional Information
Top Hole	1.025	835 psi		
			35.8	
1000	1.505	1193		
			35.7	
2000	1.985	1550		
			35.5	
3000	2.460	1905		
			35.3	
4000	2.935	2258		
			35.0	
4500	3.170	2433		
			35.6	
5000	3.410	2611		
			35.6	
5500	3.650	2790		
			35.5	
5700	3.745	2861		
5799		2897	(extrapolated)	

Remarks: Well flowing on 8/64" choke @ 358 B.O.P.D. rate (last 2 hr. ave.).
Uncorrected gas volume - 4300 c.f. daily.
All measurements from D. F.

BOTTOM HOLE PRESSURE SURVEY E-386

Flowing Pressure

Date April 7 & 8, 1952

Company Murphy Corporation Field East Poplar Lease and Well No. E.P.U. No. 1

Location C SW NE 2-28N-51E County Roosevelt State Montana

WELL DATA:

Elevation: 2135 DF / 2123 Ground Datum Point: 5799 Top Formation

Formation: Madison Perforation: 5799-5827

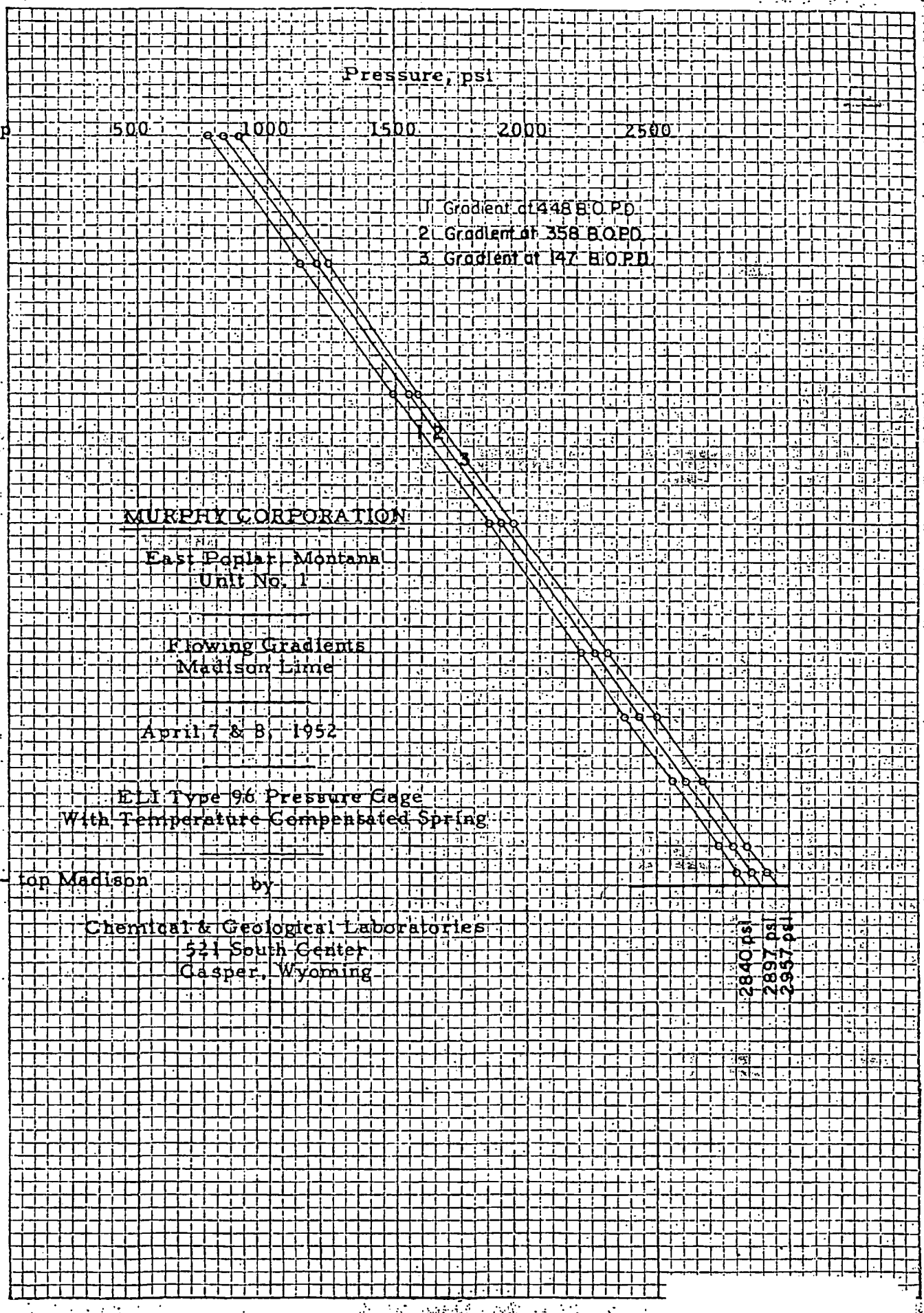
N.T.D.: 5827 Tubing Press: 910 psi

Casing: 7" @ 5814 Casing Press: - - - -

Tubing: 2½" EUE @ 5750

Depths	Extension Inches	Pressure	Gradient #/100'	Additional Information
Top Hole	1.100	892 psi		
			34.2	
1000	1.560	1234		
			35.0	
2000	2.030	1584		
			36.9	
3000	2.525	1953		
			36.4	
4000	3.015	2317		
			36.0	
4500	3.255	2497		
			35.4	
5000	3.495	2674		
			34.4	
5500	3.725	2846		
			37.0	
5700	3.825	2920		
5799		2957	(extrapolated)	

Remarks: Well flowing on 6/64" choke @ 147 B.O.P.D. rate (last 2 hr. ave.).
Uncorrected gas volume - 2760 cu. ft. daily.
All measurements from D. F.


Pressure, psi
Top
500
1000
1500
2000
2500
1000
2000
3000
4000
5000
5799 - top Madison
Depth, feet
1. Gradient at 448 B.O.P.D.
2. Gradient at 358 B.O.P.D.
3. Gradient at 147 B.O.P.D.
MURPHY CORPORATION
East Poplar, Montana
Unit No. 1
Flowing Gradients
Madison Lime
April 7 & 8, 1952
ELI Type 96 Pressure Gage
With Temperature Compensated Spring
by
Chemical & Geological Laboratories
521 South Center
Casper, Wyoming
2840 psi
2897 psi
2957 psi
DATA SHEETS
CHARLES TAILLING COMPANY, INC.
10 X 10 to the inch.